

A TAXONOMIC TREATMENT OF THE GENERA
AND SPECIES OF THE AMARANTHACEAE
IN OKLAHOMA

By

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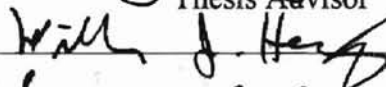
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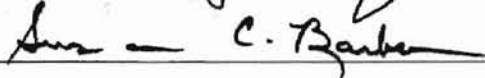
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TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
II. METHODOLOGY: PREPARATION OF THE TAXONOMIC TREATMENTS	5
III. TAXONOMIC TREATMENT OF THE AMARANTHACEAE	10
IV. RESULTS AND DISCUSSION	27
V. LITERATURE CITED	33
APPENDICES	37
APPENDIX A- DELTA-CHARS	37
APPENDIX B- DELTA-SPECS	103
APPENDIX C- DELTA-ITEMS	105
APPENDIX D- DELTA-TONAT	114

LIST OF TABLES

Table	Page
1. Taxa of the Amaranthaceae in Oklahoma	4
2. Herbaria from which specimens were examined	7
3. Number of specimens examined for each taxon	8
4. Information recorded and characters examined for each taxon	9
5. Taxa of the Amaranthaceae determined to be present in Oklahoma in this study	32

CHAPTER I

INTRODUCTION

Within Oklahoma's boundaries, one can find a diversity of species that are commonly found in other areas of the continental United States. Species from various phytogeographic regions of the United States have representatives in the flora of Oklahoma. Taxonomists indicate that there are approximately 2,600 species of vascular plants in the state in 173 families and 850 genera (Tyrl et al. 1994). Although the state has such a diverse flora, there is not a comprehensive manual to aid both botanists and laymen in identification of the plants. Currently, U.T. Waterfall's (1969) *Keys to the Flora of Oklahoma* is the manual of choice. Because no technical descriptions of the taxa accompany these keys, one must use a neighboring state's manual, e.g. *Manual of the Vascular Plants of Texas* (Correll and Johnston, 1970), in order to read the descriptions essential for accurate identification of unknown plants.

In 1983, the taxonomists of Oklahoma formed a non-profit corporation, Flora Oklahoma Incorporated, and began the task of writing a taxonomic manual for the state's vascular flora. This manual will include not only keys to the flora, but also detailed descriptions that will facilitate identification of plants. In the last five years, work on the Flora of Oklahoma Project has been progressing steadily. Several versions of the key to the families have been developed and tested in university classrooms throughout

the state. Family descriptions are currently being written, and work will soon begin on the construction of keys to the genera and species of each family. Also, the project's editorial board adopted use of the database, DELTA (Description Language for Taxonomy) written by Dallwitz and Paine (1986). This database provides a standardized format for the taxon descriptions that will be presented in the flora. Numerous individuals have been asked by the board to contribute their taxonomic expertise by writing treatments of the families and genera. The family treatment presented in this thesis is one such contribution.

The Amaranthaceae, or Pigweed Family, can be found in all parts of the world. Globally the family comprises approximately 65 genera and 900 species (Cronquist 1981). In Oklahoma, it is represented by 7-8 genera and 21 species according to Taylor and Taylor (1994) and Waterfall (1969). As is apparent in Table 1, there are differences in taxonomic opinion with respect to which genera and species are present. In addition to those species noted by Waterfall(1969) and Taylor and Taylor (1994), the Weed Identification Committee of the Southern Weed Science Society reports that *Amaranthus powellii* S. Wats is found as well in the state (nd). Traditionally, species of the Amaranthaceae have been difficult to identify. The most significant problem in identification is that the species hybridize readily within the genera (Sauer 1955, 1956, 1967; Sammour et al. 1993, Tucker and Sauer 1958). As a result, many individuals exhibit intermediate morphologies, and positive identification of such plants is often tenuous.

The objectives of the work summarized in this thesis were to determine which genera and species of the family are present in Oklahoma, and to produce taxonomic keys and technical descriptions for them for the Flora of Oklahoma Project. These keys and descriptions will allow easy and correct identification of unknown plants.

TABLE 1: Taxa of the Amaranthaceae in Oklahoma.

Taxa recognized by Waterfall (1969)	Taxa recognized by Taylor & Taylor (1994)	Common Name of Taxa
<i>Alternanthera repens</i> (L.) Kuntze ¹	<i>Alternanthera caracasana</i> H.B.K. ¹	Chaff Flower
<i>Amaranthus albus</i> L.	<i>Amaranthus albus</i> L.	Tumbleweed
<i>Amaranthus arenicola</i> I.M. Johnston	<i>Amaranthus arenicola</i> I.M. Johnston	Sandhill Pigweed
<i>Amaranthus graecizans</i> L. ¹	<i>Amaranthus blitoides</i> S. Wats. ¹	Prostrate Pigweed
	<i>Amaranthus gracilis</i> Desf.	Slender Pigweed
<i>Amaranthus hybridus</i> L.	<i>Amaranthus hybridus</i> L.	Green Pigweed
<i>Amaranthus palmeri</i> S. Wats.	<i>Amaranthus palmeri</i> S. Wats.	Redroot Pigweed, Carelessweed
<i>Amaranthus retroflexus</i> L.	<i>Amaranthus retroflexus</i> L.	Rough Pigweed
<i>Amaranthus scleropoides</i> Uline & Bray	<i>Amaranthus scleropoides</i> Uline & Bray	Bone-Bract Pigweed
<i>Amaranthus spinosus</i> L.	<i>Amaranthus spinosus</i> L.	Spiny Pigweed
<i>Amaranthus tamarascinus</i> Nutt. ¹	<i>Amaranthus rudis</i> Sauer ¹	Water Hemp
<i>Brayulinea densa</i> (Humb.&Bonpl. ex Willd.) Small ¹	<i>Guilleminea densa</i> (Willd.) Moq. ¹	Dense Cotton Flower
<i>Froelichia floridana</i> (Nutt.) Moq.	<i>Froelichia floridana</i> (Nutt.) Moq.	Field Snake Cotton
<i>Froelichia gracilis</i> (Hook.) Moq.	<i>Froelichia gracilis</i> (Hook.) Moq.	Slender Snake Cotton
<i>Gossypianthus lanuginosus</i> (Poir.) Moq.	<i>Gossypianthus lanuginosus</i> (Poir.) Moq.	Cotton Flower
<i>Gossypianthus tenuiflorus</i> Hooker		Cotton Flower
<i>Iresine rhizomatosa</i> Standl.	<i>Iresine rhizomatosa</i> Standl.	Bloodleaf
<i>Tidestromia lanuginosa</i> (Nutt.) Standl.	<i>Tidestromia lanuginosa</i> (Nutt.) Standl.	Espanta Vaqueros

¹ - Waterfall (1969) and Taylor and Taylor (1969) used different binomials for the same taxon.

of the DELTA database; technical descriptions of the
characters were constructed (Appendices B-C-D).

1.3.3. Data Analysis: The data were analyzed using

CHAPTER II

METHODOLOGY

PREPARATION OF THE TAXONOMIC TREATMENTS

Preparation of the amaranth treatments began with an extensive literature review. General information about the family and its taxa was gathered (Cronquist 1981, Gleason and Cronquist 1991, Gray 1950, Heywood 1978, National Research Council 1984, Robertson 1981, Sauer 1955, 1956, 1967; Tucker and Sauer 1958, Uline and Bray 1895, Zomlefer 1994). After this information was collected, expanded searches were undertaken to find problems concerning nomenclature, identification, and classification that have been associated with the family's genera and species (Henrickson 1987, Kartesz 1994, Mears 1967, Sammour et al. 1993, Taylor and Taylor 1994).

As the literature review was conducted, loans of specimens from state herbaria were requested (Table 2). Specimens were identified using available keys (Correll and Johnston 1979, Great Plains Flora Association 1986, Waterfall 1969). Table 3 lists the number of specimens examined for each taxon. Measurements of morphological characters were made and recorded on data sheets (Table 4). After all specimens were identified and measured, the morphological data were analyzed, interpreted, and input into DELTA using the CHARS data set developed by the editorial board (Appendix A). The keys and descriptions were submitted for review to the editorial board of the Flora of Oklahoma Project. The herbarium sheets subsequently were annotated and returned to

their respective herbaria. Using the DELTA database, technical descriptions of the species and genera found in the state were constructed (Appendices B,C, D).

The technical description for each taxon reflects the range of morphological variation found in Oklahoma. In several taxa, the information presented in the genus and species descriptions overlap. This is deliberate; the editorial board will eventually determine the format for presentation of overlapping information in the manual.

TABLE 2: Herbaria from which specimens were examined.

University of Oklahoma	
Oklahoma State University	(1)
University of Science and Arts in Oklahoma	(1)
University of Central Oklahoma	(1)

TABLE 3: Number of specimens examined for each taxon.

<i>Alternanthera caracasana</i> Kunth	7
<i>Amaranthus albus</i> L.	63
<i>Amaranthus arenicola</i> I.M. Johnston	35
<i>Amaranthus graecizans</i> L.	64
<i>Amaranthus hybridus</i> L.	33
<i>Amaranthus palmeri</i> S. Wats.	53
<i>Amaranthus retroflexus</i> L.	70
<i>Amaranthus rudis</i> Sauer	114
<i>Amaranthus scleropoides</i> Uline & Bray	3
<i>Amaranthus spinosus</i> L.	51
<i>Froelichia floridana</i> (Nutt.) Moq.	127
<i>Froelichia gracilis</i> (Hook.) Moq.	116
<i>Gossypianthus lanuginosus</i> (Poir.) Moq.	28
<i>Guilleminea densa</i> (Humb. & Bonpl. ex Willd.) Moq.	7
<i>Iresine rhizomatosa</i> Standl.	78
<i>Tidestromia lanuginosa</i> (Nutt.) Standl.	38

TABLE 4: Information recorded and characters examined for each taxon.

SPECIES	SEPALS
COUNTY	number
SHEET NUMBER	arrangement
SEX	fusion
HABIT	color
VESTITURE	shape
HABITAT	apex
	margins
	base
STEMS	STAMENS
number	adnation
branching	position
color	number
height/length	connation
surface	length
other	
ROOTS	ANTHERS
	color
LEAVES	shape
duration	dehiscence
complexity	length
arrangement	
other	FILAMENTS
	color
LEAF BLADE	length
color	
shape	PISTILS
length	number
width	adnation
surface	position
venation	
vestiture(upper&lower)	STIGMA
apex	lobe number
margins	color
base	shape
teeth	length
other	
PETIOLE	STYLE
color	number
length	length
vestiture	
other	OVARY
SPINES	number
	ovule number
INFLORESCENCE	placentation
type	
position	FRUITS
other	type
	dehiscence
BRACTS	color
length	shape
width	width
apex	length
base	surface
appearance	other
venation	
FLOWERS	SEEDS
perfect/imperfect	color
complete/incomplete	diameter
symmetry	length
ovary position	shape
other	surface

CHAPTER III

TAXONOMIC TREATMENT OF THE AMARANTHACEAE

AMARANTHACEAE A.L. de Jussieu

Pigweed or Amaranth Family

Plants herbs; annuals or perennials; bearing perfect flowers or dioecious or monoecious or polygamo-monoecious. **Stems** prostrate to erect. **Leaves** herbaceous; simple; opposite or alternate; blades lanceolate or ovate or linear; venation pinnate; indumentum pubescent or stellate or glabrous; margins entire or sinuate; stipules absent. **Inflorescences** glomerules or spikes or panicles; terminal or axillary; bracts present; membranous or scarious; bracteoles present. **Flowers** perfect or imperfect; perfect and imperfect similar; perianths in 1-series. **Calyces** radially symmetrical or rarely bilaterally symmetrical. **Sepals** 2 to 5; in 1; free or fused; reddish-green to white; scarious or membranous. **Stamens** 5 or 1 to 3; free or fused by filaments. **Pistils** 1; compound; stigmas 1 to 3, linear or capitate; styles 1; ovaries superior; carpels 2 or 3; locules 1; placentation basal; ovules 1. **Fruits** utricles; indehiscent or dehiscent; circumscissile. **Seeds** 1.

The family is represented in Oklahoma by 7 genera and 16 species. In general, the species are weedy in nature and favor disturbed habitats. Their fruits are an important wildlife food, and species of *Amaranthus* were cultivated as a grain crop by Native Americans.

1. Leaves alternate. *Amaranthus*
1. Leaves opposite.
 2. Stems erect. Inflorescences terminal.
 3. Plants annual; with a taproot. Inflorescences spikes.
Flowers perfect. Sepals fused; with dense long
villous hairs. *Froelichia*
 3. Plants perennial; rhizomatous. Inflorescences panicles.
Flowers imperfect; plants dioecious. Sepals free;
glabrous. *Iresine*
 2. Stems prostrate to ascending. Inflorescences axillary.
 4. Plants annual. Stems stellate. *Tidestromia*
 4. Plants perennial. Stems glabrous or variously
indumented but not stellate.
 5. Plants perennial from elongate roots. Basal

- leaves not present. Sepals with long glochidiate hairs. *Alternanthera*
5. Plants perennial from a branching caudex. Basal leaves present, but caducous. Sepals without long glochidiate hairs.
6. Sepals fused. Filament tubes of stamens fused to calyces. Hypanthium present; cup-like. *Guilleminea*
6. Sepals free. Filament tubes of stamens free from calyces. Hypanthium absent. *Gossypianthus*

Alternanthera Forsk.

Chaff Flower

Plants herbs; perennials; from fleshy roots; few stemmed; bearing perfect flowers. **Root Systems** with a central taproot. **Stems** branched; prostrate; 1-5 dm long. **Leaves** all alike; simple; opposite; spreading; blades spatulate to obovate, 9-10 mm wide, 1.5-2.5 cm long; venation pinnate; indumentum pilose; apices obtuse and mucronate; margins entire and undulate; bases cuneate; petioles 3.5-5 mm long, pilose; stipules absent. **Inflorescences** axillary glomerules; bracts present, 1 mm wide, 1.5-3 mm long. **Flowers** produced simultaneously with or after leaves; perfect; all alike; perianths in 1-series, radially symmetrical. **Sepals** 5; all alike; persistent; free; ascending; hyaline; lanceolate to ovate; 1-1.2 mm wide; 2-3.2 mm long; surfaces smooth; venation parallel with 3 veins; indumentum of glochidiate hairs along margins and nerves; apices acuminate and mucronate; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 5; opposite the sepals; of equal length; exerted beyond perianth; fused by filaments at their base; filamentous; 1 mm long; anthers versatile, dehiscing longitudinally, straight, 0.5-1 mm long. **Pistils** 1; stigmas 1, not lobed, capitate, 0.1 mm long; styles 1, apical, included within perianth, 0.1 mm long; ovaries superior, ovoid in LS; carpels 1; locules 1; placentation basal; ovules 1, 1 per locule. **Fruits** utricle, indehiscent, ovoid, 0.7-0.8 mm in diameter, 0.5-0.6 mm long, glabrous. **Seeds** 1; 0.1 mm in diameter.

The genus is represented in Oklahoma by 1 species.

Alternanthera caracasana Kunth

Chaff Flower

Plants herbs; perennials; from fleshy roots; few stemmed; bearing perfect flowers. **Root Systems** with a central taproot. **Stems** branched; prostrate; 1-5 dm long. **Leaves** all alike; simple; opposite; spreading; blades spatulate to obovate, 9-10 mm wide, 1.5-2.5 cm long; venation pinnate; indumentum pilose; apices obtuse and mucronate; margins entire and undulate; bases cuneate; petioles 3.5-5 mm long, pilose; stipules absent. **Inflorescences** axillary glomerules; bracts present, 1 mm wide, 1.5-3 mm long. **Flowers** produced simultaneously with or after leaves; perfect; all alike; perianths in 1-series, radially symmetrical. **Sepals** 5; all alike; persistent; free; ascending; hyaline; lanceolate

to ovate; 1-1.2 mm wide; 2-3.2 mm long; surfaces smooth; venation parallel with 3 veins; indumentum of glochidiate hairs along margins and nerves; apices acuminate and mucronate; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 5; opposite the sepals; of equal length; exerted beyond perianth; fused by filaments at their base; filamentous; 1 mm long; anthers versatile, dehiscing longitudinally, straight, 0.5-1 mm long. **Pistils** 1; stigmas 1, not lobed, capitate, 0.1 mm long; styles 1, apical, included within perianth, 0.1 mm long; ovaries superior, ovoid in LS; carpels 1; locules 1; placentation basal; ovules 1, 1 per locule. **Fruits** utricles, indehiscent, ovoid, 0.7-0.8 mm in diameter, 0.5-0.6 mm long, glabrous. **Seeds** 1; 0.1 mm in diameter.

A. caracasana is a weed of roadsides, fields, and waste places, and is mainly found in the southern quarter of the state. *A. repens* is sometimes used as the name for Chaff Flower, but this name is a synonym of *A. caracasana* Kunth and *A. pungens* Kunth. Oklahoma specimens fall within the circumscription of *A. caracasana*. Flowering is from July to October.

Amaranthus L.

Pigweed or Amaranth

Plants herbs; annuals; single stemmed or few stemmed; monoecious or dioecious or bearing perfect flowers. **Root systems** with a central taproot. **Stems** branched; erect or ascending. **Leaves** herbaceous or membranous; cauline; simple; alternate; blades obovate or ovate or lanceolate or rhombic, or spatulate; venation pinnate; indumentum glabrous or occasionally puberulent; apices obtuse or acute or rounded and mucronate or acute and mucronate or acuminate and mucronate; margins entire and undulate; bases cuneate or attenuate; petioles glabrous or puberulent; stipules absent. **Inflorescences** glomerules and spikes or glomerules or spikes, axillary and terminal; bracts present. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of perfect flowers or similar to those of pistillate flowers, in 1-series; **calyces** radially symmetrical. **Sepals** 3 or 5; all alike; free; appressed or ascending; membranous; lanceolate or ovate or oblong or spatulate; venation a single vein; indumentum glabrous; apices obtuse and mucronate or acute and mucronate or obtuse or acute or acuminate; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 3 or 5; fused by filaments at their base; anthers versatile, dehiscing longitudinally. **Pistillate Flowers** present; perianths similar to those of staminate flowers or occasionally different from those of staminate flowers, in 1-series, radially symmetrical or bilaterally symmetrical. **Pistils** 1; compound; stigmas 3 or 2; styles present, 1 with 2 or 3 lobes, free; ovaries superior, elliptical in LS, carpels 3 or 2; locules 1; placentation basal; ovules 1. **Fruits** utricles; dehiscent circumscissile; subglobose; glabrous. **Seeds** 1; reddish brown to black; smooth; lustrous; ovoid or lenticular or discoid.

The genus is represented in Oklahoma by 8 species. Although *Amaranthus gracilis* Desf. was reported to be collected in Oklahoma (SIDA 12(1): 233-237, J. Taylor #32067), specimens of this species were not encountered in the herbarium collections examined. Sheets were requested from the herbarium of Southeastern Oklahoma State University

(DUR), but none were received. *Amaranthus powellii* S. Wats also has been reported in the state (Weed Identification Committee of the Southern Weed Science Society, nd.), but specimens of this species were not encountered.

1. Plants with rigid spines at the nodes. *Amaranthus spinosus*
1. Plants without rigid spines at the nodes.
 2. Plants monoecious.
 3. Inflorescences only axillary; glomerules
 4. Plants prostrate Sepals 3. *Amaranthus albus*
 4. Plants erect or ascending. Sepals 4-5. *Amaranthus graecizans*
 3. Inflorescences both terminal and axillary; spikes or glomerules or both.
 5. Leaves with a villous pubescence associated with the veins especially on abaxial surfaces. Sepal apices round, mucronate. *Amaranthus retroflexus*
 5. Leaves glabrous. Sepal apices acute, not mucronate. *Amaranthus hybridus*
 2. Plants dioecious.
 6. Plants staminate.
 7. Bract apices not mucronate. *Amaranthus arenicola*
 7. Bract apices mucronate.
 8. Outer bracts 1.5-3 mm long. Leaf blades rhombic-ovate to rhombic-lanceolate; apices acute or acuminate. *Amaranthus rudis*
 8. Outer bracts 4-6 mm long. Leaf blades oblong to lanceolate-oblong or rhombic-oblong; apices rounded or obtuse. *Amaranthus palmeri*
 6. Plants pistillate.
 9. Petioles 0.2-2.5 mm long. Sepals 1 or 2; lanceolate-ovate. *Amaranthus rudis*
 9. Petioles 6-95 mm long. Sepals 5; spatulate.
 10. Sepals recurved; apices emarginate and apiculate or with a short excurrent midvein. Midvein branched. Bracts 1.5-2.5 mm long. *Amaranthus arenicola*
 10. Sepals not recurved; apices acute or with a long excurrent midvein. Midvein not branched. Bracts 3-6 mm long. *Amaranthus palmeri*

Amaranthus albus* L.*Tumbleweed** *indumentum rounded*

Plants herbs; annuals; single stemmed; monoecious. **Root Systems** with a central taproot. **Stems** branched; erect; 25-41(62) cm tall. **Leaves** simple; alternate; blades obovate, 0.2-0.6(1) mm wide, 0.5-2.5 cm long; venation pinnate; indumentum glabrous or occasionally puberulent; apices obtuse or acute; margins entire and undulate; bases cuneate; petioles 1-15 mm long, glabrous; stipules absent. **Inflorescences** glomerules, axillary; bracts present, 0.5-1 mm wide, 2-3(4) mm long. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of pistillate flowers. **Calyces** radially symmetrical. **Sepals** 3; free; lanceolate to oblong; 0.2-0.5 mm wide; 0.8-2 mm long; venation a single vein; indumentum glabrous; apices acute; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 3; fused by filaments at their base; 1.5 mm long; anthers versatile, dehiscing longitudinally, 1 mm long; filaments 0.8 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers; in 1-series; radially symmetrical. **Sepals** 3; free; lanceolate to oblong; 0.2-0.5 mm wide; 0.8-2 mm long; venation a single vein; indumentum glabrous; apices acute; margins entire; bases rounded. **Pistils** 1; compound; stigmas 3; styles 3, 0.3-0.6 mm long; ovaries superior; carpels 3; locules 1; placentation basal; ovules 1. **Fruits** utricle; dehiscent circumscissile; subglobose; 0.8-1.1 mm in diameter; 1-2 mm long; glabrous. **Seeds** 1; reddish brown to black; (0.1)0.5-0.8(1) mm in diameter; smooth; shining; lenticular.

A. albus is a weed commonly associated with dry disturbed prairies, fields, roadsides, banks of streams and lakes, and other waste places. It is found throughout the state. Flowering is from June to October.

Amaranthus arenicola* I.M. Johnston*Sandhills Pigweed,
Sandhills Amaranth**

Plants herbs; annuals; single stemmed; dioecious. **Root Systems** with a central taproot. **Stems** branched; erect; 40-90 cm tall. **Leaves** herbaceous; cauline; simple; alternate; blades oblong to ovate to lanceolate; 0.4-2 mm wide; 1.3-3.5 cm long; venation pinnate; indumentum glabrous; apices obtuse and mucronate; margins entire and undulate; bases cuneate or attenuate; petioles 6-20(37) mm long, glabrous; stipules absent. **Inflorescences** glomerules; axillary; bracts present, 0.5-1 mm wide, 1.5-2(2.5) mm long. **Staminate Inflorescences** glomerules; axillary; bracts 0.5-1 mm wide, 1.5-2(2.5) mm long. **Pistillate Inflorescences** glomerules; axillary; bracts present, 0.5-1 mm wide, 1.5-2(2.5) mm long. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of pistillate flowers; in 1-series; radially symmetrical. **Sepals** 5; free; lanceolate to ovate; (0.5)1-1.6 mm wide; 2-3 mm long; venation a single vein; indumentum glabrous; apices acute or obtuse; margins entire; bases rounded. **Stamens** 5; fused by filaments; 1.5-2.5 mm long; anthers versatile, 1-2 mm long; filaments 0.5-2.5 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers; in 1-series; radially symmetrical. **Sepals** 5; recurved; free;

spathulate; 1-1.2 mm wide; 2-3 mm long; venation a single branched vein; indumentum glabrous; apices emarginate and apiculate or mucronate; margins entire; bases rounded. **Pistils** 1; compound; stigmas 3; styles 1 with 3 branches, 0.5-1 mm long; ovaries superior, elliptical in LS; carpels 3; locules 1; placentation basal; ovules 1. **Fruits** utricles; dehiscent circumscissile; 1-1.2 mm in diameter; 1.2-2 mm long; glabrous. **Seeds** 1; reddish brown; 1-1.5 mm in diameter; smooth; lustrous; ovoid or occasionally lenticular.

A. arenicola is a weedy species that favors sandy habitats. It is commonly seen along the roadsides, edges of fields, disturbed prairies, waste places, and stream and creek banks. Its distribution includes the western half of the state. Flowering is from July to November.

Amaranthus graecizans L.

Prostrate Pigweed

Plants herbs; annuals; single stemmed; monoecious. **Root Systems** with a central taproot. **Stems** branched; prostrate; 9.5-55 cm long. **Leaves** simple; alternate; blades obovate to elliptic, 2-10 mm wide, 0.7-2.5 cm long; venation pinnate; indumentum glabrous or occasionally puberulent; apices obtuse and mucronate; margins entire and undulate; bases cuneate; petioles (2)4-15 mm long, glabrous; stipules absent. **Inflorescences** glomerules, axillary; bracts present, 0.2-1.6 mm wide, (1.2)2-3 mm long. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of pistillate flowers; in 1-series. **Calyces** radially symmetrical. **Sepals** 5; free; oblong to lanceolate; (0.1)0.5-0.8 mm wide; 1.1-2.2(2.6) mm long; venation a single vein; indumentum glabrous; apices acute; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 3; fused by filaments at their base; 1.3-1.8 mm long; anthers versatile, dehiscing longitudinally, 0.8-1 mm long; filaments 1.3-1.8 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers; in 1-series. **Sepals** 4-5; free; oblong to lanceolate; (0.1)0.5-0.8 mm wide; 1.1-2.2(2.6) mm long; venation a single vein; indumentum glabrous; apices acute; margins entire; bases rounded. **Pistils** 1; compound; stigmas 3; styles 3, 0.2-0.8 mm long; ovaries superior; carpels 3; locules 1; placentation basal; ovules 1. **Fruits** utricles; dehiscent circumscissile; subglobose; (0.4)1-1.5 mm in diameter; 0.7-2 mm long; glabrous and rugose. **Seeds** 1; reddish brown to black; (0.8)1-1.5 mm in diameter; smooth; shining; lenticular.

A. graecizans is a weedy species commonly associated with dry disturbed prairies, fields, roadsides, banks of streams and lakes, and other waste places. Some taxonomists recognize *Amaranthus blitoides* S. Wats. as the binomial for this taxon; however *A. graecizans* L. was published before *A. blitoides* S. Wats. Because of the principles of priority, *A. graecizans* is the correct name for the taxon. It is found throughout the state. Flowering is from July to October.

Amaranthus hybridus L.Green Pigweed,
Green Amaranth

Plants herbs; annuals; single stemmed; monoecious. **Root Systems** with a central taproot. **Stems** branched; erect; 45 cm tall (approximately). **Leaves** simple; alternate; blades ovate to rhombic to lanceolate, 1-5 mm wide, 3-12.5 cm long; venation pinnate; indumentum glabrous; apices acute and mucronate; margins entire and undulate; bases cuneate; petioles 8-45 mm long, glabrous; stipules absent. **Inflorescences** spikes, terminal and axillary; bracts present, 0.5-1 mm wide, 2-5 mm long. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of perfect flowers, in 1-series, radially symmetrical. **Calyces** radially symmetrical. **Sepals** 5; all alike; free; oblong; 0.2-0.5 mm wide; 1.5-2.5 mm long; venation a single vein; indumentum glabrous; apices acute; margins entire; bases rounded. **Stamens** 5; included within perianth; fused by filaments at their base; 2-3.2 mm long; anthers versatile, 0.5-1.5 mm long, filaments 1-3 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers. **Sepals** 5; free; oblong; 0.5 mm wide; 1.5-2.5 mm long; venation a single vein; indumentum glabrous; apices acute; margins entire; bases rounded. **Pistils** 1; compound; stigmas 3; styles 1, included within perianth, 0.5-1 mm long; ovaries superior; carpels 3; locules 1, placentation basal; ovules 1. **Fruits** utricle; slightly rugose; dehiscent circumscissile; subglobose; 1-1.5 mm in diameter; 2 mm long; glabrous. **Seeds** 1; black; 1 mm in diameter; smooth; lustrous; ovoid to lenticular.

A. hybridus is a weedy species commonly found in fields, along roadsides, and other waste places. It is found throughout the state, excluding the panhandle. Flowering is from June to November.

Amaranthus palmeri S. Wats.Redroot Pigweed,
Carelessweed

Plants herbs; annuals; single stemmed; dioecious. **Root Systems** with a central taproot. **Stems** branched; erect; 20-80 (105)cm tall. **Leaves** simple; alternate; blades rhombic to ovate, 14-27(45)mm wide, 1.6-8.7(11.1) cm long; venation pinnate; indumentum glabrous; apices acuminate or acute or obtuse and mucronate; margins entire and undulate; bases cuneate or attenuate; petioles 10-85(95) mm long, glabrous; stipules absent. **Inflorescences** spikes and glomerules; terminal and axillary; bracts present; 0.2-1.6 mm wide; (2)3-5.5(6)mm long. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths different from those of pistillate flowers; in 1-series; radially symmetrical. **Sepals** 5; free; appressed; lanceolate; 0.6-1.2 mm wide; 2-4 mm long; venation a single vein; indumentum glabrous; apices acute, or acuminate, margins entire, bases rounded. **Stamens** 5, included within perianth, fused by filaments at their base, 1-2(2.5) mm long; anthers versatile, 0.5-1.6 mm long; filaments 0.5-1(2) mm long. **Pistillate Flowers** present; perianths different from those of staminate flowers, in 1-series, radially symmetrical. **Calyces** radially symmetrical. **Sepals**

5; spatulate; (0.5)0.8-1.2 mm wide; 2-3 mm long; venation a single vein; indumentum glabrous; apices acute and mucronate for the outer sepals, and obtuse or mucronate for the inner sepals; margins entire; bases rounded. **Pistils** 1, compound; stigmas 2 or 3; styles present, 1 with 2 or 3 lobes, included within perianth, 1-2 mm long; ovaries superior, elliptical in LS; carpels 2 or 3; locules 1; placentation basal; ovules 1. **Fruits** utricles; dehiscent circumscissile; subglobose; 0.8-1.2 mm in diameter; 1-1.8 mm long; glabrous. **Seeds** 1; reddish brown; 1-1.2 mm in diameter; smooth; lustrous; ovoid.

A. palmeri is a weedy species that prefers disturbed sites. Roadsides, creek beds, riverbanks, railroad right-of-ways, disturbed fields, and disturbed prairies are common habitats. It is mainly found in the western two-thirds of the state. Flowering is from June to October.

***Amaranthus retroflexus* L.**

**Rough Pigweed,
Rough Amaranth**

Plants herbs; annuals; single stemmed; monoecious. **Root Systems** with a central taproot. **Stems** branched; erect; 25-50 cm long. **Leaves** membranous; cauline; simple; alternate; blades rhombic to ovate or lanceolate, 14-53 mm long, 3-7(10.2) cm long; venation pinnate; indumentum puberulent especially along veins; apices rounded and mucronate or acute and mucronate; margins entire and undulate; bases cuneate; petioles 12-60 mm long, puberulent; stipules absent. **Inflorescences** dense spikes, terminal and axillary; bracts present, (0.2)0.8-1.2 mm wide, 2.5-5 mm long. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of pistillate flowers, in 1-series, radially symmetrical. **Sepals** 5; free; 0.5-1 mm wide; 2-3 mm long; venation a single vein; indumentum glabrous; apices acute and mucronate; margins entire; bases rounded. **Stamens** 5; included within perianth; fused by filaments (at base); 1-2.5 mm long; anthers versatile, (0.8)1-1.2(2) mm long; filaments 1-2 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers, in 1-series, radially symmetrical. **Sepals** 5; free; linear to oblong; 0.5-1 mm wide; 2-3 mm long; venation a single vein; indumentum glabrous; apices rounded and mucronate; margins entire; bases rounded. **Pistils** 1, compound; stigmas 3; styles 3, free, included within perianth, 0.5-1 mm long; ovaries superior; carpels 3; locules 1; placentation basal; ovules 1. **Fruits** utricles; dehiscent circumscissile; subglobose; 1-1.5 mm wide; 2-3 mm long; glabrous. **Seeds** 1; reddish brown; 1 mm in diameter; smooth; lustrous; ovoid or discoid.

A. retroflexus is a weedy species of disturbed sites. It is found in floodplains, bar ditches, and at the edges of fields, and is found in the western half of the state. Flowering is from May to October.

Amaranthus rudis* Sauer*Water Hemp**

Plants herbs; annuals; single stemmed; dioecious. **Root Systems** with a central taproot. **Stems** branched; erect; 20-125 cm tall. **Leaves** simple; alternate; blades 6-15 mm wide, 0.7-4.5(5.5) cm long; venation pinnate; indumentum glabrous; apices obtuse and mucronate; margins entire and undulate; bases cuneate; petioles 0.2-2.5 mm long, glabrous; stipules absent. **Inflorescences** interrupted and terminal spikes or axillary glomerules; bracts present, 0.5-1.2 mm wide, 1.5-3 mm long. **Staminate Inflorescences** spikes or glomerules; terminal and axillary; bracts present, 0.5-1.2 mm wide, 1.5-3 mm long. **Pistillate Inflorescences** spikes or glomerules; terminal and axillary; bracts present, 0.5-1.2 mm wide, 1.5-3 mm long. **Flowers** imperfect; staminate and pistillate different. Staminate flowers present; perianths different from those of pistillate flowers; in one series; radially symmetrical. **Sepals** 5; all alike; free; lanceolate; 0.5-1.2(1.8) mm wide; 1.8-3 mm long; indumentum glabrous; apices acuminate for outer sepals, and obtuse or mucronate for inner sepals; margins entire; bases rounded. **Stamens** 5; included within perianth; 1-2(3.5) mm long; anthers versatile, 1-1.8 mm long; filaments 0.3-1.5(2.1) mm long. **Pistillate Flowers** present; perianths different from those of staminate flowers, in 1-series, bilaterally symmetrical. **Calyces** bilaterally symmetrical. **Sepals** 2; free; ascending; lanceolate to ovate; 0.2-1 mm wide; 0.5-2 mm long; indumentum glabrous; apices acute to acuminate or obtuse and occasionally mucronate; margins entire; bases rounded. **Pistils** 1; stigmas 3; styles 3, included within perianth, 0.5-1.1 mm long; ovaries superior, elliptical in LS; carpels 3; locules 1; placentation basal; ovules 1. **Fruits** utricles; dehiscent; subglobose; 0.8-1.4 mm in diameter; 1-1.5 mm long; glabrous. **Seeds** 1; reddish brown; 1 mm in diameter; smooth; lustrous; ovoid to lenticular.

A. rudis commonly is found in or near stream banks, lakeshores, floodplains, fields, and bar ditches. Its distribution is statewide. *A. tamarascinus* Nutt. was the name once used, but Sauer (1972) determined that the name *A. tamarascinus* was invalid for these fertile plants because the specimen to which Nuttall's name referred was a sterile hybrid between *A. hybridus* and an unnamed dioecious species. *A. x tamarascinus* Nutt. may be present in the state, but specimens that were examined were fertile. This species is also known as *Acnida tamarascina* (Nutt.) Wood by taxonomists who believe that the dioecious species should be recognized as a distinct genus. Flowering is from June to October.

Amaranthus scleropoides* Uline & Bray*Bone-Bract Pigweed,
Bone-Bract Amaranth**

Plants herbs; annuals; few stemmed; monoecious or occasionally bearing perfect flowers. **Root Systems** with a central taproot. **Stems** whitish; branched; erect or ascending; 10-21 cm tall. **Leaves** simple; alternate; blades oblong to spatulate; 3.5-6 mm wide; 1.2-2 cm long; venation pinnate; indumentum glabrous; apices obtuse and mucronate; margins entire and undulate; bases cuneate; petioles 9-16 mm long, glabrous;

stipules absent. **Inflorescences** glomerules; axillary; bracts present; ovate, triangular, much thickened, and succulent; 0.6-1 mm wide; 1-2.4 mm long. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of pistillate flowers, in one series, radially symmetrical. **Calyces** radially symmetrical. **Sepals** 5; free; membranous; lanceolate to spatulate; 0.4-0.5 mm wide; 1.5-2 mm long; venation a single vein; indumentum glabrous; apices acute; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 5; included within perianth; fused by filaments at their base. 2 mm long; anthers versatile, 1 mm long; filaments 1.1 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers, in 1-series, radially symmetrical. **Sepals** 5; free; appressed; membranous; lanceolate to spatulate; 0.4-0.5 mm wide; 1.5-2 mm long; venation a single vein; indumentum glabrous; apices acute; margins entire; bases rounded. **Pistils** 1, compound; stigmas 2; styles present, 1 with 2 lobes, included within perianth, 0.6-1 mm long; ovaries superior, elliptical in LS; carpels 2; locules 1; placentation basal; ovules 1. **Fruits** utricles; dehiscent circumscissile; subglobose; 1-1.4 mm in diameter; 1.4-1.6 mm long; glabrous. **Seeds** 1; reddish brown; 1-1.2 mm in diameter; smooth; lustrous; ovoid to lenticular.

A. scleropoides is found in grass flats. Its distribution in Oklahoma is limited to Major County; though, it is found in several counties in Texas (Correll & Johnston 1970). Although reported to flower throughout the year (Correll & Johnston 1970), our specimens indicate only August as the flowering time.

Amaranthus spinosus L.

Spiny Pigweed, Spiny Amaranth

Plants herbs; annuals; single stemmed; monoecious. **Root Systems** with a central taproot. **Stems** branched; erect; 25-50(70) cm tall. **Leaves** simple; alternate; blades lanceolate to ovate, (8)12-35(46) mm wide, 1.2-8 cm long; venation pinnate; indumentum glabrous; apices obtuse and mucronate; margins entire; bases cuneate; petioles 8-68 mm long, glabrous; stipules absent. **Inflorescences** of one type; spikes or glomerules; terminal and axillary; bracts present, 0.2-1(2) mm wide, 1-3 mm long. **Flowers** imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of pistillate flowers; in one series; radially symmetrical. **Calyces** radially symmetrical. **Sepals** 5; all alike; free; ascending; membranous; lanceolate; 0.5-1(1.2) mm wide; 1.2-2.5 mm long; venation a single vein; indumentum glabrous; apices obtuse and mucronate or acute and mucronate; margins entire; bases rounded. **Stamens** 5; included within perianth; fused by filaments at their base; 1-1.5(1.8) mm long; anthers versatile, 0.5-1.2(1.5) mm long, filaments 0.1-1 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers; in 1-series; radially symmetrical. **Calyces** radially symmetrical. **Sepals** 5; free; ascending; obovate to spatulate; 0.5-1 mm wide; 1-2 mm long; venation a single vein; indumentum glabrous; apices acute and mucronate or obtuse and mucronate; margins entire; bases rounded. **Pistils** 1; compound; stigmas 2 or 3; styles present, 1 with 2 or 3 lobes, included within perianth, 0.5-1.5(2) mm long; ovaries superior, elliptical in LS; carpels 2 or 3; locules 1;

placentation basal; ovules 1. **Fruits** utricle; subglobose; 0.6-1.1 mm in diameter; 1-2 mm long; glabrous. **Seeds** 1; reddish brown; 0.8-1 mm in diameter; smooth; lustrous; lenticular.

A. spinosus is a weedy species of overgrazed pastures, roadsides, fields, fence rows, and other waste places. Its distribution is the eastern half of the state mainly, but some specimens have been collected as far west as Woods County. Flowering is from June to September.

***Froelichia* Moench**

Snake Cotton

Plants herbs; annuals; single stemmed or few stemmed or multiple stemmed; bearing perfect flowers; villous. **Root Systems** with a central taproot. **Stems** branched or unbranched; erect or ascending or prostrate. **Leaves** cauline and basal; simple; opposite; blades lanceolate and oblanceolate or oblong or occasionally spatulate; venation pinnate; indumentum sericeous and pubescent; apices acute; margins entire and undulate; bases cuneate; petioles villous; stipules absent. **Inflorescences** spikes; terminal and axillary; bracts present. **Flowers** produced simultaneously with or after leaves; perfect; perianths in 1-series, radially symmetrical, flask-shaped, venation parallel, indumentum lanate, apices obtuse or acute, bases rounded. **Sepals** 5; fused; indurate; lanceolate; venation parallel 3-nerved; indumentum lanate, apices obtuse or acute; bases rounded; with sharp lateral spines or lateral crests. **Sepal Lobes** ascending or curled; membranous; lanceolate to oblong; surfaces smooth; venation parallel; indumentum glabrous; apices aristate or acute. **Androecia** radially symmetrical. **Stamens** 5; included within perianth; fused by filaments at their base; 2-5 mm long; anthers versatile. **Pistils** 1; stigmas 1, capitate, 0.1-0.2 mm long; styles 1, included within perianth; ovaries superior, ovoid in LS; carpels 1; locules 1; placentation basal; ovules 1. **Fruits** utricle; indehiscent; glabrous. **Seeds** 1; reddish brown to black.

The genus is represented in Oklahoma by 2 species.

1. Stems branched, branches occurring mainly at base of plant. Calyces with sharp lateral spines; without lateral dentate crests. *Froelichia gracilis*
1. Stems not branched, branches if present above the base of the plant. Calyces without sharp lateral spines; with 2 lateral dentate crests. *Froelichia floridana*

***Froelichia floridana* (Nutt.) Moq.**

Field Snake Cotton

Plants herbs; annuals; single stemmed or few stemmed; bearing perfect flowers; villous. **Root Systems** with a central taproot. **Stems** unbranched below, and sometimes branched above; erect; (20)30-90(125) cm tall. **Leaves** simple; opposite, blades oblanceolate to oblong or occasionally spatulate; 2.5-20(24) mm wide; (1.3)2-9(9.4) cm

long; venation pinnate; indumentum sericeous on abaxial surface, and pubescent on adaxial surface; apices acute; margins entire and undulate; bases cuneate; petioles 2-20(31) mm long, villous; stipules absent. **Inflorescences** spikes; terminal and axillary; 1.3-5 cm long; bracts present, 1.8-3.5(3.7) mm wide, 1-3 mm long. **Flowers** perfect; perianths in 1-series, radially symmetrical, flask-shaped; venation parallel; indumentum lanate; apices obtuse or acute; bases rounded. **Sepals** 5; fused; indurate; lanceolate; 0.5-1(1.5) mm wide; 3-5.5 mm long; venation parallel 3-nerved; indumentum lanate; apices obtuse or acute; bases rounded; with 2 lateral crests. **Sepal Lobes** ascending or curled; membranous; lanceolate; surfaces smooth; venation parallel; indumentum glabrous; apices aristate. **Androecia** radially symmetrical. **Stamens** 5; included within perianth; fused by filaments at their base; 3-5 mm long; anthers versatile, 0.5-1 mm long; **Pistils** 1; stigmas 1, capitate; 0.1-0.2 mm long; styles 1, included within perianth, 0.4-0.8(1) mm long, ovaries superior, ovoid in LS; carpels 1; locules 1; placentation basal; ovules 1. **Fruits** utricle; indehiscent; 1-2 mm in diameter; 1.5-2.5 mm long; glabrous. **Seeds** 1; reddish brown to black; 1-1.5(2) mm in diameter.

F. floridana is a species found in sandy soils. Sites such as sand dunes, stream valleys, roadsides, abandoned fields, disturbed prairies, and the edges of woodlands are common habitats. It is found throughout the state. Flowering is from June to October.

Froelichia gracilis (Hook.) Moq.

Slender Snake Cotton

Plants herbs; annuals; multiple stemmed; bearing perfect flowers. **Root Systems** with a central taproot. **Stems** branched; ascending or prostrate; not jointed. **Leaves** cauline and basal; simple; opposite; petiolate or sessile; blades lanceolate, 0.3-1.1 mm wide, 2-5(7)cm long; venation pinnate; indumentum sericeous; apices acute and occasionally acuminate; margins entire and undulate; bases cuneate; petioles 2-8 mm long; stipules absent. **Inflorescences** spikes; terminal and axillary; bracts present, 0.5-3 mm wide, 0.5-2(3) mm long. **Flowers** produced simultaneously with or after leaves; perfect; perianths in 1-series; radially symmetrical; flask-shaped; venation parallel; indumentum lanate; apices obtuse or acute; margins entire and undulate; bases rounded. **Sepals** 5; fused at base, and free above; indurate; lanceolate; 0.5-1.2 mm wide; 2.5-4(6) mm long; venation parallel 3-nerved; indumentum lanate; apices obtuse or acute; bases rounded; with sharp lateral spines. **Sepal Lobes** ascending or curled; membranous; lanceolate to oblong; surfaces smooth; venation parallel; indumentum glabrous; apices acute. **Stamens** 5; included within perianth; fused by filaments at their base; 2-4.5 mm long; anthers versatile, 0.3-1.2 mm long. **Pistils** 1; stigmas 1, capitate, 0.1-0.2 mm long; styles 1, included within perianth, 0.3-0.8 mm long; ovaries superior, ovoid in LS; carpels 1; locules 1; placentation basal; ovules 1. **Fruits** utricle; indehiscent; 1-2.5 mm in diameter; 1-3 mm long; glabrous. **Seeds** 1; reddish brown to black; 0.8-1.5 mm in diameter.

F. gracilis is found in sandy soils. Sites such as sand dunes, stream valleys, roadsides, abandoned fields, disturbed prairies, and woodlands are habitats. Occasionally, it is

found at the bottoms of canyons. It is found throughout the state. Flowering is from June to October.

***Gossypianthus* Hook.**

Cotton Flower

Plants herbs; perennials; from caudices or crowns; few stemmed to multiple stemmed; bearing perfect flowers. **Root Systems** with a central taproot. **Stems** branched; prostrate to decumbent; not jointed; 5-30 cm long. **Leaves** present; all alike; forming a basal rosette and cauline; simple; opposite; petiolate; blades of the basal leaves linear and lanceolate or spatulate, and ovate or obovate or lanceolate for cauline leaves; 2-6(12) mm wide; 0.4-1.2(1.5) cm long; venation pinnate; indumentum villous; apices acute or occasionally obtuse; margins entire and undulate; bases cuneate; petioles winged. villous; stipules absent. **Inflorescences** of one type; glomerules; axillary; bracts present. 0.6-1.6 mm wide, 1.5-2.5 mm long. **Flowers** produced simultaneously with or after leaves; perfect; all alike. **Sepals** 5; all alike; free; lanceolate; 0.5-1(2) mm wide; 1.5-3 mm long; surfaces smooth; venation parallel or parallel-convergent; indumentum lanate; apices acute; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 5, opposite the sepals, included within perianth, free, 1-16 mm long; anthers versatile, dehiscent longitudinally, straight, 0.2-0.5(0.8) mm long. **Pistils** 1; stigmas 1, 2-lobed, rounded, 0.1 mm long; styles present, 1, apical, included within perianth, 0.1-0.3(0.5) mm long; ovaries superior, ovoid in LS; carpels 1; locules 1; placentation basal; ovules 1. **Fruits** utricle; indehiscent; wings absent; plano-convex to lenticular; 0.5-1(1.5) mm in diameter; 0.8-2 mm long; glabrous. **Seeds** 1; 1.5-3 mm in diameter.

The genus is represented in Oklahoma by 1 species.

***Gossypianthus lanuginosus* (Poir.) Moq.**

Cotton Flower

Plants herbs; perennials; from caudices or crowns; few stemmed to multiple stemmed; bearing perfect flowers. **Root Systems** with a central taproot. **Stems** branched; prostrate to decumbent; not jointed; 5-30 cm long. **Leaves** present; all alike; forming a basal rosette and cauline; simple; opposite; petiolate; blades of the basal leaves linear and lanceolate or spatulate, and ovate or obovate or lanceolate for cauline leaves; 2-6(12) mm wide; 0.4-1.2(1.5) cm long; venation pinnate; indumentum villous; apices acute or occasionally obtuse; margins entire and undulate; bases cuneate; petioles winged, villous; stipules absent. **Inflorescences** of one type; glomerules; axillary; bracts present, 0.6-1.6 mm wide, 1.5-2.5 mm long. **Flowers** produced simultaneously with or after leaves; perfect; all alike. **Sepals** 5; all alike; free; lanceolate; 0.5-1(2) mm wide; 1.5-3 mm long; surfaces smooth; venation parallel or parallel-convergent; indumentum lanate; apices acute; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 5, opposite the sepals, included within perianth, free, 1-16 mm long; anthers versatile, dehiscent longitudinally, straight, 0.2-0.5(0.8) mm long. **Pistils** 1; stigmas 1, 2-lobed, rounded, 0.1 mm long; styles present, 1, apical, included within perianth, 0.1-0.3(0.5) mm long; ovaries superior, ovoid

in LS; carpels 1; locules 1; placentation basal; ovules 1. **Fruits** utricle; indehiscent; wings absent; plano-convex to lenticular; 0.5-1(1.5) mm in diameter; 0.8-2 mm long; glabrous. **Seeds** 1; 1.5-3 mm in diameter.

G. lanuginosus is a weedy species found along roadsides, in stream valleys, and in sandy or rocky prairies. Several varieties of *G. lanuginosus* are found in the state. Its distribution is throughout the state. Flowering is from June to November.

***Guilleminea* Kunth**

Dense Cotton Flower

Plants herbs; perennials; from caudices or crowns; few stemmed; bearing perfect flowers. **Root Systems** with a central taproot. **Stems** branched; prostrate; 8-32 cm long. **Leaves** forming a basal rosette and cauline; simple; opposite phyllotaxy for the cauline leaves; spreading; blades of the radical leaves are usually lost before fruiting; lanceolate to spatulate for the basal leaves, and ovate to lanceolate for the cauline ones; cauline leaves 10-13 mm wide, 20-25 cm long; surfaces smooth; venation pinnate; indumentum glabrous and lanate; apices acute; margins entire and undulate; petioles broadly winged, 0.2-0.3 mm long; stipules absent. **Inflorescences** glomerules; densely clustered; axillary; bracts present, 0.6-1.2 mm wide, 1.2-1.8 mm long. **Flowers** perfect, perianths in 1-series, radially symmetrical; venation a single vein; indumentum lanate. **Sepals** 5, free and fused, reflexed, hyaline, lanceolate; venation a single vein; indumentum lanate; with perianth fibers. **Sepal Lobes** lanceolate, 0.5-1 mm wide, 1 mm long; venation a single vein; indumentum glabrous; apices acute to mucronulate; margins entire. **Stamens** 5, included within perianth, episepalous, fused by filaments, 0.2-0.5 mm long; anthers versatile, 0.1 mm long. **Pistils** 1; stigmas 2, inconspicuous, 0.1 mm long; styles present, 1 with 2 lobes, included within perianth, 0.1-0.3 mm long; ovaries superior; ovoid in LS; carpels 2; locules 1; placentation basal; ovules 1. **Fruits** utricle; indehiscent; ovoid; 0.6 mm in diameter; 1 mm long; glabrous. **Seeds** 1; reddish brown; 0.9-1 mm in diameter.

The genus is represented in Oklahoma by 1 species.

***Guilleminea densa* (Humb. & Bonpl. ex Willd.) Moq. Dense Cotton Flower**

Plants herbs; perennials; from caudices or crowns; few stemmed. **Root Systems** with a central taproot. **Stems** branched; prostrate; 8-32 cm long. **Leaves** forming a basal rosette and cauline; simple; opposite phyllotaxy for the cauline leaves; spreading; blades of the radical leaves are usually lost before fruiting; lanceolate to spatulate for the basal leaves, and ovate to lanceolate for the cauline ones; cauline leaves 10-13 mm wide, 20-25 cm long; surfaces smooth; venation pinnate; indumentum glabrous and lanate; apices acute; margins entire and undulate; petioles broadly winged, 0.2-0.3 mm long; stipules absent. **Inflorescences** glomerules; densely clustered; axillary; bracts present, 0.6-1.2 mm wide, 1.2-1.8 mm long. **Flowers** perfect, perianths in 1-series, radially symmetrical; venation a single vein; indumentum lanate. **Sepals** 5, free and fused, reflexed, hyaline, lanceolate;

venation a single vein; indumentum lanate; with perianth fibers. **Sepal Lobes** lanceolate, 0.5-1 mm wide, 1 mm long; venation a single vein; indumentum glabrous; apices acute to mucronulate; margins entire. **Stamens** 5, included within perianth, episepalous, fused by filaments, 0.2-0.5 mm long; anthers versatile, 0.1 mm long. **Pistils** 1; stigmas 2, inconspicuous, 0.1 mm long; styles present, 1 with 2 lobes, included within perianth, 0.1-0.3 mm long; ovaries superior; ovoid in LS; carpels 2; locules 1; placentation basal; ovules 1. **Fruits** utricles; indehiscent; ovoid; 0.6 mm in diameter; 1 mm long; glabrous. **Seeds** 1; reddish brown; 0.9-1 mm in diameter.

G. densa is a weedy species that prefers dry, sandy, rocky prairies, pastures, roadsides, canyons, and other waste places. In Oklahoma, this Great Plains species is found only in Cimmaron County. Dense Cottonflower was once known as *Brayulinea densa* (Humb. & Bonpl. ex Willd.) Moq; however, now *B. densa* is recognized as a nomenclatural synonym for *G. densa*. Flowering is from June to October.

Iresine P. Br.

Bloodleaf

Plants herbs; perennials; from rhizomes; single stemmed; dioecious. **Root Systems** with a central taproot. **Stems** occasionally branched; erect; 30-110 cm tall. **Nodes** slightly swollen. **Leaves** scarious; simple; opposite; blades lanceolate to ovate, 15-60(80) mm wide, 3-15 cm long; venation pinnate; indumentum glabrous; apices acute to acuminate; margins entire or occasionally serrulate; bases cuneate; petioles 8-35 mm long, glabrous; stipules absent. **Inflorescences** panicles; bracts present, 0.3-1 mm wide, 0.6-1.2(1.5) mm long. **Staminate Inflorescences** panicles; bracts present. **Pistillate Inflorescences** panicles. **Flowers** produced simultaneously with or after leaves; imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of pistillate flowers, in 1-series, radially symmetrical, surfaces smooth, indumentum villous at the base of sepals; apices acute to acuminate; margins entire; bases rounded. **Calyces** radially symmetrical. **Sepals** 5; free; silvery white; hyaline; lanceolate to ovate; 0.3-1 mm wide; 1-1.8 mm long; indumentum villous at base of sepal; apices acute to acuminate; margins entire; bases rounded. **Stamens** 5, included within perianth, fused by filaments at their base, 0.5-1.2 mm long; anthers versatile, 0.1-0.5 mm long; filaments 0.3-1 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers, in 1-series, radially symmetrical. **Sepals** 5; free; ascending; hyaline; lanceolate to ovate; 0.3-1 mm wide; 1-1.8 mm long; indumentum villous at base of sepals; apices acute to acuminate; margins entire; bases rounded. **Pistils** 1, compound; stigmas 2, 0.2-0.5 mm long; styles 1, included within perianth, 0.1 mm long; ovaries superior; carpels 2; locules 1; placentation basal; ovules 1. **Fruits** utricles; indehiscent; subglobose; 0.4-0.8(1) mm in diameter; 0.5-1.5(2) mm long. **Seeds** 1; reddish brown; 0.2-0.8 mm in diameter; smooth; shining; lenticular.

The genus is represented in Oklahoma by 1 species.

Iresine rhizomatosa* Standl.*Bloodleaf**

Plants herbs; perennials; from rhizomes; single stemmed; dioecious. **Root Systems** with a central taproot. **Stems** occasionally branched; erect; 30-110 cm tall. **Nodes** slightly swollen. **Leaves** scarious; simple; opposite; blades lanceolate to ovate, 15-60(80) mm wide, 3-15 cm long; venation pinnate; indumentum glabrous; apices acute to acuminate; margins entire or occasionally serrulate; bases cuneate; petioles 8-35 mm long, glabrous; stipules absent. **Inflorescences** panicles; bracts present, 0.3-1 mm wide, 0.6-1.2(1.5) mm long. **Staminate Inflorescences** panicles; bracts present. **Pistillate Inflorescences** panicles. **Flowers** produced simultaneously with or after leaves; imperfect; staminate and pistillate similar. **Staminate Flowers** present; perianths similar to those of pistillate flowers, in 1-series, radially symmetrical, surfaces smooth, indumentum villous at the base of sepals; apices acute to acuminate; margins entire; bases rounded. **Calyces** radially symmetrical. **Sepals** 5; free; silvery white; hyaline; lanceolate to ovate; 0.3-1 mm wide; 1-1.8 mm long; indumentum villous at base of sepal; apices acute to acuminate; margins entire; bases rounded. **Stamens** 5, included within perianth, fused by filaments at their base, 0.5-1.2 mm long; anthers versatile, 0.1-0.5 mm long; filaments 0.3-1 mm long. **Pistillate Flowers** present; perianths similar to those of staminate flowers, in 1-series, radially symmetrical. **Sepals** 5; free; ascending; hyaline; lanceolate to ovate; 0.3-1 mm wide; 1-1.8 mm long; indumentum villous at base of sepals; apices acute to acuminate; margins entire; bases rounded. **Pistils** 1, compound; stigmas 2, 0.2-0.5 mm long; styles 1, included within perianth, 0.1 mm long; ovaries superior; carpels 2; locules 1; placentation basal; ovules 1. **Fruits** utricle; indehiscent; subglobose; 0.4-0.8(1) mm in diameter; 0.5-1.5(2) mm long. **Seeds** 1; reddish brown; 0.2-0.8 mm in diameter; smooth; shining; lenticular.

I. rhizomatosa prefers low wet woods, stream banks, and wooded areas at the base of canyons, bluffs, and hills. It is found mainly in the eastern half of the state. Exceptions include populations in Caddo and Comanche counties. Flowering is from August to November.

***Tidestromia* (Nutt.) Standl.**

Plants herbs; annuals; single stemmed or few stemmed or multiple stemmed; bearing perfect flowers; stellate pubescence, older stems somewhat glabrous. **Root Systems** with a central taproot. **Stems** branched; ascending; 10-50 cm long. **Leaves** forming a basal rosette to cauline; simple; opposite; blades obovate to ovate, 6-22 mm wide, 0.5-2.2 cm long; venation pinnate; indumentum stellate; apices acute to obtuse; margins entire and undulate; bases cuneate; petioles 2-30 mm long, stellate; stipules absent. **Inflorescences** glomerules; axillary; bracts present, 0.7-1.8 mm wide, 1-3 mm long. **Flowers** perfect; perianths in 1-series, radially symmetrical, flask-shaped; venation a single vein; indumentum stellate; apices acute; margins entire; bases rounded. **Sepals** 5; free; ascending; lanceolate; 0.5-1 mm wide; 1.75-3(3.5) mm long; venation a single vein;

indumentum stellate; apices acute; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 5; included within perianth; fused by filaments at their base; 1-2 mm long; anthers versatile, 0.5-1(1.3) mm long. **Pistils** 1; stigmas 1, capitate, 0.1-0.3(0.5) mm long; styles 1, included within perianth, 0.1-0.2(2.5) mm long; ovaries superior, ovoid in LS; carpels 1; locules 1; placentation basal; ovules 1. **Fruits** utricles; indehiscent; 0.5-0.8 (1) mm in diameter; 0.5-1(1.5)mm long; glabrous. **Seeds** 1; 0.2-0.8(1) mm in diameter.

The genus is represented in Oklahoma by 1 species.

***Tidestromia lanuginosa* (Nutt.) Standl.**

Espanta Vaqueros

Plants herbs; annuals; single stemmed or few stemmed or multiple stemmed; stellate pubescence, older stems somewhat glabrous. **Root systems** with a central taproot. **Stems** branched; ascending; 10-50 cm long. **Leaves** forming a basal rosette to cauline; simple; opposite; blades obovate to ovate, 6-22 mm wide, 0.5-2.2 cm long; venation pinnate; indumentum stellate; apices acute to obtuse; margins entire and undulate; bases cuneate; petioles 2-30 mm long, stellate; stipules absent. **Inflorescences** glomerules; axillary; bracts present, 0.7-1.8 mm wide, 1-3 mm long. **Flowers** perfect; perianths in 1-series, radially symmetrical, flask-shaped; venation a single vein; indumentum stellate; apices acute; margins entire; bases rounded. **Sepals** 5; free; ascending; lanceolate; 0.5-1 mm wide; 1.75-3(3.5) mm long; venation a single vein; indumentum stellate; apices acute; margins entire; bases rounded. **Androecia** radially symmetrical. **Stamens** 5; included within perianth; fused by filaments at their base; 1-2 mm long; anthers versatile, 0.5-1(1.3) mm long. **Pistils** 1; stigmas 1, capitate, 0.1-0.3(0.5) mm long; styles 1, included within perianth, 0.1-0.2(2.5) mm long; ovaries superior, ovoid in LS; carpels 1; locules 1; placentation basal; ovules 1. **Fruits** utricles; indehiscent; 0.5-0.8 (1) mm in diameter; 0.5-1(1.5)mm long; glabrous. **Seeds** 1; 0.2-0.8(1) mm in diameter.

T. lanuginosa is a weedy species that is commonly found in bar ditches, sand dunes, field edges, grass flats, stream valleys, and at the bases of sandstone and gypsum ridges. It is found in the western half of the state. Flowering is from June to October.

CHAPTER IV

RESULTS AND DISCUSSION

During my review of the Amaranthaceae of Oklahoma, I examined herbarium specimens representative of 7 genera and 16 species (Table 5). This is in contrast to the 21 taxa previously reported (Waterfall, 1969; Taylor & Taylor, 1994). This difference in numbers is due to changes in classification and/or nomenclature of the taxa, and the lack of specimens documenting the presence of taxa reported to be in the state. In the following paragraphs, these changes are summarized.

Alternanthera repens (L.) Kuntze

Waterfall (1969) used this binomial for Oklahoma specimens of Chaff Flower. In more recent taxonomic treatments, however, it has been recognized as a synonym of *A. caracasana* Kunth (Correll & Johnston, 1970) and *A. pungens* Kunth (Kartesz, 1994). Our specimens fall within the circumscription of *A. caracasana* Kunth. In particular, they have spatulate to suborbicular blades that are longer than they are broad which is in contrast to those of *A. pungens*. *A. pungens* usually has blades that are orbicular to broadly ovate, and usually as broad as they are long. Also, our specimens have glochidiate hairs on the veins and margins of the sepals, which is a diagnostic character of *A. caracasana*. Specimens of *A. pungens* do not have these hairs on their sepals. As a nomenclatural aside, Waterfall incorrectly cited Carl Kuntze as the author of *A. repens*.

Johann Link is the proper authority for *A. repens*. His name is a homonym of Johann F. Gmelin's *A. repens*.

Amaranthus gracilis Desf.

Although reported to be collected in Oklahoma (SIDA 12(1): 233-237; J. Taylor #32067), specimens of this species were not encountered in the herbarium collections examined. Sheets were requested from the herbarium of Southeastern Oklahoma State University (DUR), Taylor's institution, but none were received.

Amaranthus blitoides S. Wats.

Several taxonomists have used this binomial to describe Oklahoma species of Prostrate Pigweed. This binomial is incorrectly applied to this taxon because the name does not have priority.

In 1753, Linneaus published the binomial, *A. graecizans*, to describe a prostrate species of amaranth. In 1759, he described an erect species of amaranth that looked very similar. He published the name *A. albus* to describe that plant. In 1877, S. Watson must have overlooked Linneaus's description and described a prostrate species of amaranth with the same characters of Linneaus's plant, and named it *A. blitoides*. Because the appearance of the two taxa are so similar in morphology, Uline and Bray (1894) misused the binomial *A. graecizans* L. They used it to describe the erect plant and not the prostrate amaranth. In 1945, Fernald suggested that we should use *A. blitoides* for the prostrate amaranth species because of the confusion associated with the binomial, *A.*

graecizans. In this manner, the binomial *A. albus* would be used to describe the erect species, and *A. blitoides* would be used to describe the prostrate species. Although Fernald makes a good argument for the use of *A. blitoides* S. Wats. as the name for Prostrate Pigweed, the International Code of Botanical Nomenclature state that the oldest, correctly published name has priority. Therefore, *A. graecizans* was used in this work.

Amaranthus powellii S. Wats.

Although the Weed International Committee of the Southern Weed Science Society (nd) reports this species to be present in the state, specimens of this species were not encountered in the herbarium collections examined.

Amaranthus tamariscinus Nutt.

The binomial *A. tamariscinus* Nutt. was used by Waterfall(1969) and other taxonomists for Water Hemp, a dioecious species with dehiscent utricles and one well-developed and one vestigial sepal in the pistillate flowers. Sauer (1972) discovered that Nuttall's type specimen resembled sterile hybrids artificially produced by Murray (1940) between plants of monoecious *A. hybridus* L. and those of an unnamed dioecious species of the southeastern Great Plains possessing dehiscent utricles and pistillate flowers with one well-developed sepal. Sauer contended that *A. tamariscinus* was mistakenly applied to the early collections of plants of this dioecious species that he named *A. rudis* Sauer (1972). He noted that Nuttall had collected a specimen of the species, labelled the sheet

as *A. virgatus* with an asterisk beside the specific epithet indicating that he thought it to be a new species, but failed to publish the name. *A. x tamariscinus* may be present in Oklahoma, however, all specimens examined in this study were fertile. Fertility of the specimens was based upon the production of seeds.

Brayulinea densa (Humb. & Bonpl. ex Willd.) Small

This genus name and binomial were used by Waterfall (1969) for Oklahoma specimens of Dense Cottonflower. He was following Small (1903) who published the genus name *Brayulinea* as a replacement for *Guilleminea* Kunth (1823) which was a homonym of *Guilleminea* Necker (1790). In 1939, the Nomenclatural Committee of the 6th International Botanical Congress ruled that Necker's name was illegitimate and that Kunth's name could be used. Because Kunth's *Guilleminea* has priority over Small's *Brayulinea*, *Brayulinea* and *B. densa* became nomenclatural synonyms and cannot be used. Thus Oklahoma plants of Dense Cottonflower are *G. densa* (Humb. & Bonpl. ex Willd.) Moq.

Gossypianthus tenuiflorus Hook.

Oklahoma specimens of Cotton Flower were recognized by Waterfall (1969) as a distinct species. This taxon now is recognized as a variety of *G. lanuginosus* based on the work of Henrickson (1987). He believed that the differences in indumentation and leaf length were not ample to recognize the taxon as a distinct species. He believed that

the taxon merely reflected localized variation within certain populations of *G.*

lanuginosus.

Chalk Flower
 Lavender
 Scabell's Pinweed
 Zinnia
 Purple Poppy
 Dandelion
 ...

...
 ...

...

TABLE 5: Taxa determined to be present in Oklahoma in this study.

<i>Alternanthera caracasana</i> Kunth	Chaff Flower
<i>Amaranthus albus</i> L.	Tumbleweed
<i>Amaranthus arenicola</i> I.M. Johnston	Sandhills Pigweed
<i>Amaranthus graecizans</i> L.	Prostrate Pigweed
<i>Amaranthus hybridus</i> L.	Green Pigweed
<i>Amaranthus palmeri</i> S. Wats.	Redroot Pigweed
<i>Amaranthus retroflexus</i> L.	Rough Pigweed
<i>Amaranthus rudis</i> Sauer	Water Hemp
<i>Amaranthus scleropoides</i> Uline & Bray	Bone-Bract Pigweed
<i>Amaranthus spinosus</i> L.	Spiny Pigweed
<i>Froelichia floridana</i> (Nutt.) Moq.	Field Snake Cotton
<i>Froelichia gracilis</i> (Hook.) Moq.	Slender Snake Cotton
<i>Gossypianthus lanuginosus</i> (Poir.) Moq.	Cotton Flower
<i>Guilleminea densa</i> (Humb. & Bonpl. ex. Willd.) Moq.	Dense Cotton Flower
<i>Iresine rhizomatosa</i> Standl.	Bloodleaf
<i>Tidestromia lanuginosa</i> (Nutt.) Standl.	Espanta Vaqueros

CHAPTER V

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APPENDIX A

DELTA-CHARS

*SHOW: Species of the Amaranthaceae in Oklahoma - character list: Revised 19 April 1996

*CHARACTER LIST

- #1. plants <distinctive, general descriptors that serve to characterize the taxon>/
- #2. plants <habit> <MANDATORY>/
1. trees/
 2. small trees/
 3. shrubs/
 4. subshrubs <suffrutescent or lateral branches deciduous>/
 5. succulents/
 6. woody vines/
 7. herbaceous vines/
 8. woody epiphytes <Phoradendron>/
 9. herbaceous epiphytes <Polypodium>/
 10. woody canes/
 11. herbs/
 12. thalloid, not differentiated into stems and leaves/
- #3. plants <longevity of non-woody plants> <MANDATORY IF APPLICABLE>/
1. annuals/
 2. biennials/
 3. perennials/
- #4. plants <perennating organs>/
1. with perennating organs absent/
 2. from rhizomes/
 3. from stolons/
 4. from tubers/
 5. from corms/
 6. from bulbs/
 7. from caudices or crowns/
 8. from fleshy roots/
 9. from pseudobulbs <Liparis>/
 10. from turions <submerged aquatics>/
 11. from roots/
- #5. plants <habit of woody plants>/
1. deciduous <implicit>/
 2. evergreen/
- #6. plants <mode of nutrition>/
1. autophytic <implicit>/
 2. parasitic/
 3. semiparasitic/
 4. saprophytic/
 5. insectivorous/
 6. mycotrophic/
- #7. plants <habit>/
1. terrestrial <implicit>/
 2. emergent aquatics/
 3. floating-leaved aquatics/
 4. free-floating aquatics/
 5. submergent aquatics/
 6. floating aquatics/
- #8. plants <whether caulescent>/
1. caulescent <implicit>/
 2. acaulescent/
- #9. plants <number of stems>/
1. single stemmed/
 2. few stemmed/
 3. multiple stemmed/
- #10. plants <distinctive odor>/
1. strongly aromatic/

- 2 not aromatic <implicit>/
- #11 plants <whether armed with spines>/
1 armed with spines/
2 not armed with spines <implicit>/
- #12 plants <whether armed with thorns>/
1 armed with thorns/
2 not armed with thorns <implicit>/
- #13 plants <whether armed with prickles>/
1 armed with prickles/
2 not armed with prickles <implicit>/
- #14 plants <whether armed with stinging hairs>/
1 armed with stinging hairs/
2 not armed with stinging hairs <implicit>/
- #15 plants <with tendrils>/
1 with tendrils/
2 without tendrils <implicit>/
- #16 plants <description of conspicuous indumentation of entire plant>/
- #17 plants <reproductive habit>/
1 producing flowers <implicit>/
2 producing pollen cones and seed cones <Coniferophyta>/
3 producing pollen cones and pairs of ovules at ends of peduncles <Ginkgo>/
4 producing terminal strobili <Equisetum, Selaginella, and Lycopodium>/
5 producing sporangia embedded in leaf bases <Isoetes>/
6 producing sporangia borne in sporocarps <Marsileaceae>/
7 producing aggregations of sporangia <Lygodiaceae, Ophioglossaceae, Osmundaceae, Dryopteridaceae>/
8 producing sporangia clustered in sori <ferns sensu stricto>/
- #18 plants <reproductive habit of flowering plants>/
1 bearing perfect flowers <implicit>/
2 monoecious <plant with both staminate & pistillate flowers>/
3 dioecious <separate plants with staminate or pistillate flowers>/
4 polygamo-monoecious <plant with perfect, staminate & pistillate flowers>/
5 polygamo-dioecious <staminate and/or pistillate plants with some perfect flowers>/
6 andromonoecious <plant with staminate and perfect flowers>/
7 gynomonoecious <plant with pistillate and perfect flowers>/
8 androdioecious <plants with either perfect or staminate flowers>/
9 gynodioecious <plants with either perfect or pistillate flowers>/
10 trioecious <separate plants with perfect or staminate or pistillate flowers>/
11 polygamous <plants with both perfect and imperfect flowers, but arrangement not specified>/
- #19 sap <viscosity>/
1 thin <implicit>/
2 viscous/
- #20 sap <color>/
1 colorless <implicit>/
2 white/
3 yellow/
4 orange/
5 red/
- #21 root systems <distinctive, general descriptors that serve to characterize the taxon>/
- #22 root systems/
1 fibrous/
2 with a central taproot/
3 haustorial/
4 absent/
- #23 pneumatophores <presence>/
1 present <Taxodium>/
2 absent <implicit>/
- #24 stems <distinctive, general descriptors that serve to characterize the taxon>/
- #25 stems <branching>/
1 branched/
2 unbranched/
- #26 stems <habit>/
1 erect/
2 ascending/
3 geniculate/
4 decumbent/
5 prostrate/

- 6 trailing/
- #27 stems <whether jointed>/
1 jointed/
2 not jointed <implicit>/
- #28 stems <height including inflorescence>/
cm tall/
- #29 stems <length when plants prostrate>/
cm long/
- #30 branches <distinctive, general characters that serve to distinguish the taxon>/
- #31 branches <arrangement in unusual taxa>/
1 whorled <Ephedra>/
2 pseudowhorled <Pinus>/
3 fasciated <Ephedra, Arundinaria>/
4 opposite <Ephedra>/
- #32 terminal buds <presence>/
1 present <implicit>/
2 absent/
- #33 terminal buds <distinctive, general characters that serve to characterize the taxon>/
- #34 terminal buds <function>/
1 vegetative/
2 floral/
3 vegetative and floral/
- #35 terminal buds <shape>/
1 globose/
2 ovoid/
3 oblong/
4 conical/
5 triangular/
6 narrowly triangular <Fagus>/
7 irregular/
- #36 <terminal buds> bud scales <presence>/
1 present <implicit>/
2 absent/
- #37 <terminal buds> bud scales <prominence>/
1 conspicuous/
2 inconspicuous/
- #38 <terminal buds> bud scales <distinctive, general characters that serve to characterize the taxon>/
- #39 <terminal buds> bud scales <specific color or color that serves to distinguish the taxon>/
- #40 <terminal buds> bud scales <number>/
1 1/
2 2/
3 3/
4 4/
5 5/
6 6/
7 7 or more/
- #41 <terminal buds> bud scales <arrangement>/
1 imbricate/
2 valvate/
3 overlapping/
- #42 <terminal buds> bud scales <surface>/
1 peltate <surface bearing shield-shaped scales borne on stalks>
<Elaeagnus>/
2 not peltate <implicit>/
- #43 <terminal buds> bud scales <texture>/
1 fleshy/
2 succulent/
3 cartilaginous <hard and tough, but flexible>/
4 chartaceous <papery, opaque and thin>/
5 coriaceous <leathery>/
6 fibrous <having loose, woody strands>/
7 flaccid <lax and weak>/
8 herbaceous <soft and succulent>/
9 hyaline <thin and translucent or transparent>/
10 indurate <hardened>/
11 membranous <thin and semi-transparent>/
12 scarious <thin and dry>/
13 spongy <cellular, sponge-like>/

- #44 <terminal buds> bud scales <presence of indumentum>
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>
 3. scaberulous <minutely scabrous>
 4. pubescent <soft, short, dense trichomes>
 5. puberulent <minutely pubescent>
 6. velutinous <soft, short, dense, straight trichomes; velvety>
 7. tomentose <soft, short, dense, matted trichomes>
 8. villous <soft, long, dense, curly, ascending trichomes>
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>
- #45 <terminal buds> bud scales <surface>
1. scurfy <surface covered with small, branlike scales>
 2. not scurfy <implicit>
- #46 lateral buds <appearance>
1. conspicuous/
 2. inconspicuous/
- #47 lateral buds <exposure>
1. exposed <implicit>
 2. hidden by expanded petiole bases/
 3. hidden in sunken pits/
- #48 lateral buds <distinctive, general characters that serve to characterize the taxon>
- #49 lateral buds <function>
1. vegetative/
 2. floral/
 3. vegetative and floral/
- #50 lateral buds <shape>
1. globose/
 2. ovoid/
 3. oblong/
 4. conical/
 5. triangular/
 6. narrowly triangular <Fagus>
 7. irregular/
- #51 lateral buds <number>
1. solitary/
 2. multiple, collateral/
 3. multiple, superposed/
- #52 lateral buds <position>
1. sessile <implicit>
 2. stalked/
 3. sunken/
- #53 lateral buds <orientation>
1. appressed/
 2. divergent/
- #54 <lateral buds> bud scales <presence>
1. present <implicit>
 2. absent/
- #55 <lateral buds> bud scales <prominence>
1. conspicuous/
 2. inconspicuous/
- #56 <lateral buds> bud scales <distinctive, general characters that serve to characterize the taxon>
- #57 <lateral buds> bud scales <specific color or color that serves to distinguish the taxon>
- #58 <lateral buds> bud scales <number>
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/

6. 6/
7. 7 or more/
- #59 <lateral buds> bud scales <arrangement>/
1. imbricate/
2. valvate/
3. overlapping/
- #60 <lateral buds> bud scales <surface>/
1. peltate <surface bearing shield-shaped scales borne on stalks>
<Elaeagnus>/
2. not peltate <implicit>/
- #61 <lateral buds> bud scales <texture>/
1. fleshy/
2. succulent/
3. cartilaginous <hard and tough, but flexible>/
4. chartaceous <papery, opaque and thin>/
5. coriaceous <leathery>/
6. fibrous <having loose, woody strands>/
7. flaccid <lax and weak>/
8. herbaceous <soft and succulent>/
9. hyaline <thin and translucent or transparent>/
10. indurate <hardened>/
11. membranous <thin and semi-transparent>/
12. scarious <thin and dry>/
13. spongy <cellular, sponge-like>/
- #62 <lateral buds> bud scales <presence of indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes, velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #63 <lateral buds> bud scales <surface>/
1. scurfy <surface covered with small, branlike scales>/
2. not scurfy <implicit>/
- #64 nodes <distinctive, general descriptors that serve to characterize the taxon>/
- #65 nodes <constriction>/
1. constricted/
2. swollen/
3. equal in diameter to internodes <implicit>/
- #66 internodes <distinctive, general descriptors that serve to characterize the taxon>/
- #67 internodes <anatomy>/
1. solid <includes spongy> <implicit>/
2. hollow/
- #68 internodes <shape in cross-section>/
1. terete <implicit>/
2. terete but flattened on one side/
3. slightly flattened/
4. strongly flattened/
5. fluted/
6. strongly angled/
7. weakly angled/
8. 3-angled/
9. 4-angled/
- #69 internodes <presence of indumentum>/
1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/

6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #70. leaves <presence>/
 1. present <implicit>/
 2. absent/
- #71. leaves <morphological forms>/
 1. all alike <implicit>/
 2. of 2 morphological forms/
 3. of 3 morphological forms/
- #72. leaves <modification>/
 1. modified into spines <Cactaceae>/
 2. modified into tendrils/
 3. modified to trap and digest animals <Drosera>/
- #73. leaves <appearance>/
 1. scale-like <Juniperus>/
 2. needle-like <Pinus>/
 3. linear <Taxodium>/
 4. awl-like <juvenile leaves of Juniperus>/
- #74. leaves <persistence>/
 1. caducous <Ephedra>/
 2. persistent for 1 year <Taxodium>/
 3. persistent for 2-12 years <Pinus, Juniperus>/
- #75. leaves <distinctive, general characters that serve to distinguish the taxon>/
- #76. leaves <texture>/
 1. fleshy/
 2. succulent/
 3. cartilaginous <hard and tough, but flexible>/
 4. chartaceous <papery, opaque and thin>/
 5. coriaceous <leathery>/
 6. fibrous <having loose, woody strands>/
 7. flaccid <lax and weak>/
 8. herbaceous <soft and succulent>/
 9. hyaline <thin and translucent or transparent>/
 10. indurate <hardened>/
 11. membranous <thin and semi-transparent>/
 12. scarious <thin and dry>/
 13. spongy <cellular, sponge-like>/
- #77. leaves <distribution>/
 1. basal/
 2. forming a basal rosette/
 3. cauline <implicit>/
- #78. leaves <complexity> <MANDATORY IF APPLICABLE>/
 1. simple/
 2. 1-pinnately compound/
 3. 2-pinnately compound/
 4. 3-pinnately compound/
 5. 4-pinnately compound/
 6. 5-pinnately compound/
 7. palmately compound/
 8. dichotomously compound/
- #79. leaves <arrangement> <MANDATORY IF APPLICABLE>/
 1. alternate/
 2. opposite/
 3. whorled/
 4. fascicled/
 5. alternate above and opposite below/
 6. alternate above and whorled below/
 7. opposite above and whorled below/
 8. opposite above and alternate below/
- #80. leaves <whether petiole present>/
 1. petiolate <implicit>/

- 2 sessile/
- 3 with basal sheaths/
- #81 leaves <attachment to stem>/
 - 1 clasping/
 - 2 perfoliate/
 - 3 connate/
 - 4 equitant/
 - 5 sheathing/
 - 6 not clasping/
 - 7 not perfoliate/
 - 8 not connate/
 - 9 not equitant/
 - 10 not sheathing/
- #82 leaves <ranking>/
 - 1 not ranked/
 - 2 2-ranked/
 - 3 3-ranked/
 - 4 4-ranked/
- #83 leaves <when whorled>/
 - number per node/
- #84 leaves <number per fascicle>/
 - per fascicle/
- #85 leaves <aspect>/
 - 1 appressed/
 - 2 ascending/
 - 3 spreading/
 - 4 reflexed/
 - 5 curled/
- #86 leaves <spacing>/
 - 1 imbricated/
 - 2 non-overlapping/
- #87 <simple leaves> blades <distinctive, general characters that serve to distinguish the taxon>/
- #88 <simple leaves> blades <shape>/
 - 1 subulate/
 - 2 acicular/
 - 3 filiform/
 - 4 linear/
 - 5 lanceolate/
 - 6 oblanceolate/
 - 7 ovate/
 - 8 obovate/
 - 9 elliptic/
 - 10 oblong/
 - 11 spatulate/
 - 12 runcinate/
 - 13 pandurate/
 - 14 deltoid/
 - 15 obdeltoid/
 - 16 cordate/
 - 17 obcordate/
 - 18 reniform/
 - 19 sagittate/
 - 20 flabellate/
 - 21 orbicular/
 - 22 oval/
 - 23 ensiform/
 - 24 rhombic/
- #89 <simple leaves> blades <attachment to petiole>/
 - 1 peltate/
 - 2 not peltate <implicit>/
- #90 blades <width>/
 - mm wide/
- #91 blades <length>/
 - cm long/
- #92 <blades of simple leaves> surfaces/
 - 1 smooth <implicit>/
 - 2 striate/
 - 3 rugose/
 - 4 punctate/
 - 5 alveolate/
 - 6 foveolate/
 - 7 pustulate/
 - 8 ribbed/
 - 9 sulcate/
- #93 <blades of simple leaves> venation <MANDATORY IF APPLICABLE>/
 - 1 parallel/

2. parallel-convergent/
 3. pinnate/
 4. palmate/
 5. dichotomous/
 6. a single vein/
 7. not apparent/
 8. pinnipalmate/
- #94 <blades of simple leaves> indumentum/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes, velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #95 <blades of simple leaves> apices/
1. aristate/
 2. caudate/
 3. acuminate/
 4. acute/
 5. cuspidate/
 6. mucronate/
 7. mucronulate/
 8. apiculate/
 9. obtuse/
 10. retuse/
 11. emarginate/
 12. attenuate/
 13. obcordate/
 14. truncate/
 15. rounded/
- #96 <blades of simple leaves> margins/
1. entire/
 2. undulate/
 3. sinuate/
 4. crenate/
 5. crenulate/
 6. erose/
 7. serrate/
 8. doubly serrate/
 9. serrulate/
 10. dentate/
 11. denticulate/
 12. incised/
 13. lacerate/
 14. lacinate/
 15. pinnately lobed/
 16. pinnately cleft/
 17. pinnately parted/
 18. palmately lobed/
 19. palmately cleft/
 20. palmately parted/
 21. pinnatifid/
 22. palmatifid/
 23. crispate/
 24. ciliate/
 25. spinose/
- #97 <blades of simple leaves> bases/
1. attenuate/
 2. cuneate/
 3. oblique/
 4. obtuse/
 5. truncate/
 6. cordate/
 7. hastate/
 8. auriculate/
 9. sagittate/
 10. rounded/

- #98. resin canals <presence in gymnosperms>/
 1. present <gymnosperms>/
 2. absent <implicit>/
- #99. leaflets <distinctive, general characters that serve to distinguish the taxon>/
- #100. leaflets <number>/
- #101. leaflets <presence of terminal one when leaves pinnately compound>
 <MANDATORY IF APPLICABLE>/
 1. terminal present
 2. terminal absent/
- #102. leaflets <shape>/
 1. subulate/
 2. acicular/
 3. filiform/
 4. linear/
 5. lanceolate/
 6. oblanceolate/
 7. ovate/
 8. obovate/
 9. elliptic/
 10. oblong/
 11. spatulate/
 12. runcinate/
 13. pandurate/
 14. deltoid/
 15. obdeltoid/
 16. cordate/
 17. obcordate/
 18. reniform/
 19. sagittate/
 20. orbicular/
 21. oval/
 22. ensiform/
- #103. leaflets <length>/
 mm long/
- #104. <leaflets> surface/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #105. <leaflets> venation/
 1. parallel/
 2. pinnate/
 3. palmate/
 4. dichotomous/
 5. a single vein/
 6. not apparent/
 7. pinnipalmate/
- #106. <leaflets> indumentum/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes, velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #107. <leaflets> apices/
 1. aristate/
 2. caudate/

3. acuminate/
4. acute/
5. cuspidate/
6. mucronate/
7. mucronulate/
8. apiculate/
9. obtuse/
10. retuse/
11. emarginate/
12. attenuate/
13. obcordate/
14. truncate/
15. rounded/

#108 <leaflets> margins/

1. entire/
2. undulate/
3. sinuate/
4. crenate/
5. crenulate/
6. erose/
7. serrate/
8. doubly serrate/
9. serrulate/
10. dentate/
11. denticulate/
12. incised/
13. lacerate/
14. lacinate/
15. pinnately lobed/
16. pinnately cleft/
17. pinnately parted/
18. palmately lobed/
19. palmately cleft/
20. palmately parted/
21. pinnatifid/
22. palmatifid/
23. crispate/
24. ciliate/
25. spinose/

#109 <leaflets> bases/

1. attenuate/
2. cuneate/
3. oblique/
4. obtuse/
5. truncate/
6. cordate/
7. hastate/
8. auriculate/
9. sagittate/
10. rounded/

#110 rachises <distinctive, general characters that serve to distinguish the taxon>/

#111. rachises <shape in cross-section>/

1. terete <implicit>/
2. terete but flattened on one side/
3. slightly flattened/
4. strongly flattened/
5. fluted/
6. strongly angled/
7. weakly angled/
8. 3-angled/
9. 4-angled/

#112. rachises <presence of wings>/

1. winged/
2. not winged <implicit>/

#113. rachises <presence of indumentum>/

1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes, velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending>/

- straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes>/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #114. petioles <distinctive, general characters that serve to distinguish the taxon>/
- #115. petioles <anatomy>/
1. solid <includes spongy> <implicit>/
 2. hollow>/
- #116. petioles <shape in cross-section>/
1. terete <implicit>/
 2. terete but flattened on one side>/
 3. slightly flattened>/
 4. strongly flattened>/
 5. fluted>/
 6. strongly angled>/
 7. weakly angled>/
 8. 3-angled>/
 9. 4-angled>/
- #117. petioles <presence of wings>/
1. winged>/
 2. not winged <implicit>/
- #118. petioles <length>/
- mm long>/
- #119. petioles <presence of indumentum>/
1. glabrous>/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberrulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes, velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes>/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #120. pulvini <presence>/
1. present>/
 2. absent <implicit>/
- #121. pulvini <presence of indumentation>/
1. glabrous>/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberrulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes, velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes>/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #122. stipules <MANDATORY IF APPLICABLE>/
1. present>/

- 2 absent/
- #123. stipules <persistence>/
- 1 persistent/
 - 2 caducous/
- #124. stipules <distinctive, general characters that serve to distinguish the taxon>/
- #125. stipules <length>/
- mm long/
- #126. scapes <distinctive, general characters that serve to distinguish the taxon>/
- #127. scapes <shape in cross-section>/
1. terete <implicit>/
 2. terete but flattened on one side/
 3. slightly flattened/
 4. strongly flattened/
 5. fluted/
 6. strongly angled/
 7. weakly angled/
 8. 3-angled/
 9. 4-angled/
- #128. scapes <presence of wings>/
- 1 winged/
 - 2 not winged <implicit>/
- #129. scapes <length>/
- mm long/
- #130. scapes <presence of indumentum>/
- 1 glabrous/
 - 2 scabrous <rough to the touch with short, hard, rigid trichomes>/
 - 3 scaberulous <minutely scabrous>/
 - 4 pubescent <soft, short, dense trichomes>/
 - 5 puberulent <minutely pubescent>/
 - 6 velutinous <soft, short, dense, straight trichomes, velvety>/
 - 7 tomentose <soft, short, dense, matted trichomes>/
 - 8 villous <soft, long, dense, curly, ascending trichomes>/
 - 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 - 10 lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 - 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 - 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 - 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 - 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 - 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 - 16 with glandular trichomes/
 - 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #131. inflorescences <morphological types>/
- 1 of one type <implicit>/
 - 2 of two types, staminate and pistillate dissimilar/
 - 3 of two types, staminate and perfect-flowered dissimilar/
 - 4 of two types, pistillate and perfect-flowered dissimilar/
- #132. inflorescences <type> <MANDATORY IF APPLICABLE>/
- 1 solitary flowers/
 - 2 simple cymes/
 - 3 scorpioid cymes/
 - 4 helioicidal cymes/
 - 5 compound cymes/
 - 6 spikes/
 - 7 spikelets/
 - 8 racemes/
 - 9 panicles/
 - 10 corymbs/
 - 11 umbels/
 - 12 heads/
 - 13 catkins/
 - 14 spadices/
 - 15 thyrses/
 - 16 hypanthodia/
 - 17 cyathia/
 - 18 glomerules/
 - 19 clusters <with descriptors>/
 - 20 paired flowers/
- #133. inflorescences <distinctive, general characters that serve to distinguish the taxon>/

- #134 inflorescences <position on plant, whether terminal or lateral>/
 1 terminal <implicit>/
 2 axillary/
- #135 inflorescences <position relative to ground or litter>/
 1 borne below ground or litter/
 2 borne above ground or litter <implicit>/
 3 borne both above and below ground or litter/
- #136 inflorescences <length>/
 cm long/
- #137 peduncles <distinctive, general characters that serve to distinguish the taxon>/
- #138 peduncles <shape in cross-section>/
 1 terete <implicit>/
 2 terete but flattened on one side/
 3 slightly flattened/
 4 strongly flattened/
 5 fluted/
 6 strongly angled/
 7 weakly angled/
 8 3-angled/
 9 4-angled/
- #139 peduncles <presence of wings>/
 1 winged/
 2 not winged <implicit>/
- #140 peduncles <length>/
 cm long/
- #141 peduncles <presence of indumentum>/
 1 glabrous/
 2 scabrous <rough to the touch with short, hard, rigid trichomes>/
 3 scaberulous <minutely scabrous>/
 4 pubescent <soft, short, dense trichomes>/
 5 puberulent <minutely pubescent>/
 6 velutinous <soft, short, dense, straight trichomes; velvety>/
 7 tomentose <soft, short, dense, matted trichomes>/
 8 villous <soft, long, dense, curly, ascending trichomes>/
 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10 lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16 with glandular trichomes/
 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #142 rachises <presence of indumentum>/
 1 glabrous/
 2 scabrous <rough to the touch with short, hard, rigid trichomes>/
 3 scaberulous <minutely scabrous>/
 4 pubescent <soft, short, dense trichomes>/
 5 puberulent <minutely pubescent>/
 6 velutinous <soft, short, dense, straight trichomes; velvety>/
 7 tomentose <soft, short, dense, matted trichomes>/
 8 villous <soft, long, dense, curly, ascending trichomes>/
 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes; silky>/
 10 lanate <soft, long, dense, matted, ascending, curly trichomes; woolly>/
 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes; cobwebby>/
 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16 with glandular trichomes/
 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #143 bracts/
 1 present/
 2 absent <implicit>/
- #144 bracts <distinctive, general characters that serve to distinguish the

- taxon>/
- #145 bracts <width>/
mm wide/
- #146 bracts <length>/
mm long/
- #147 bracteoles/
1. present/
2. absent <implicit>/
- #148 bracteoles <distinctive general characters that serve to distinguish the taxon>/
- #149 bracteoles <width>/
mm wide/
- #150 bracteoles <length>/
mm long/
- #151 spathes <presence>/
1. present/
2. absent <implicit>/
- #152 spathes <distinctive, general characters that serve to distinguish the taxon>/
- #153 spathes <width>/
mm wide/
- #154 spathes <length>/
cm long/
- #155 pedicels <length>/
mm long/
- #156 staminate inflorescences <type> <MANDATORY IF APPLICABLE>/
1. solitary flowers/
2. simple cymes/
3. scorpioid cymes/
4. helicoid cymes/
5. compound cymes/
6. spikes/
7. spikelets/
8. racemes/
9. panicles/
10. corymbs/
11. umbels/
12. heads/
13. catkins/
14. spadices/
15. thyrses/
16. hypanthodia/
17. cyathia/
18. glomerules/
19. clusters <with descriptors>/
20. paired flowers/
- #157 staminate inflorescences <distinctive, general characters that serve to distinguish the taxon>/
- #158 staminate inflorescences <position on plant, whether terminal or lateral>/
1. terminal <implicit>/
2. axillary/
- #159 staminate inflorescences <length>/
cm long/
- #160 <staminate inflorescences> peduncles <distinctive, general characters that serve to distinguish the taxon>/
- #161 <staminate inflorescences> peduncles <shape in cross-section>/
1. terete <implicit>/
2. terete but flattened on one side/
3. slightly flattened/
4. strongly flattened/
5. fluted/
6. strongly angled/
7. weakly angled/
8. 3-angled/
9. 4-angled/
- #162 <staminate inflorescences> peduncles <presence of wings>/
1. winged/
2. not winged <implicit>/
- #163 <staminate inflorescences> peduncles <length>/
cm long/

- #164 <staminate inflorescences> peduncles <presence of indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberrulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #165 <staminate inflorescences> rachises <presence of indumentum>/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberrulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes; velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #166 <staminate inflorescences> bracts/
1. present/
 2. absent/
- #167 <staminate inflorescences> bracts <distinctive, general characters that serve to distinguish the taxon>/
- #168 <staminate inflorescences> bracts <width>/
- mm wide/
- #169 <staminate inflorescences> bracts <length>/
- mm long/
- #170 <staminate inflorescences> bracteoles/
1. present/
 2. absent/
- #171 <staminate inflorescences> bracteoles <distinctive general characters that serve to distinguish the taxon>/
- #172 <staminate inflorescences> bracteoles <width>/
- mm wide/
- #173 <staminate inflorescences> bracteoles <length>/
- mm long/
- #174 <staminate inflorescences> spathes <presence>/
1. present/
 2. absent/
- #175 <staminate inflorescences> spathes <distinctive, general characters that serve to distinguish the taxon>/
- #176 <staminate inflorescences> spathes <width>/
- mm wide/
- #177 <staminate inflorescences> spathes <length>/
- cm long/

- #178 <staminate inflorescences> pedicels <length>/
mm long/
- #179 pistillate inflorescences <type> <MANDATORY IF APPLICABLE>/
1 solitary flowers/
2 simple cymes/
3 scorpioid cymes/
4 helicoidal cymes/
5 compound cymes/
6 spikes/
7 spikelets/
8 racemes/
9 panicles/
10 corymbs/
11 umbels/
12 heads/
13 catkins/
14 spadices/
15 thyrses/
16 hypanthodia/
17 cyathia/
18 glomerules/
19 clusters <with descriptors>/
20 paired flowers/
- #180 pistillate inflorescences <distinctive, general characters that serve to distinguish the taxon>/
distinguish the taxon>/
- #181 pistillate inflorescences <position on plant, whether terminal or lateral>/
1 terminal <implicit>/
2 axillary/
- #182 pistillate inflorescences <length>/
cm long/
- #183 <pistillate inflorescences> peduncles <distinctive, general characters that serve to distinguish the taxon>/
that serve to distinguish the taxon>/
- #184 <pistillate inflorescences> peduncles <shape in cross-section>/
1 terete <implicit>/
2 terete but flattened on one side/
3 slightly flattened/
4 strongly flattened/
5 fluted/
6 strongly angled/
7 weakly angled/
8 3-angled/
9 4-angled/
- #185 <pistillate inflorescences> peduncles <presence of wings>/
1 winged/
2 not winged <implicit>/
not winged <implicit>/
- #186 <pistillate inflorescences> peduncles <length>/
cm long/
- #187 <pistillate inflorescences> peduncles <presence of indumentum>/
1 glabrous/
2 scabrous <rough to the touch with short, hard, rigid trichomes>/
3 scaberulous <minutely scabrous>/
4 pubescent <soft, short, dense trichomes>/
5 puberulent <minutely pubescent>/
6 velutinous <soft, short, dense, straight trichomes, velvety>/
7 tomentose <soft, short, dense, matted trichomes>/
8 villous <soft, long, dense, curly, ascending trichomes>/
9 sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
10 lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16 with glandular trichomes/
17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
hairs aggregated into star-like clusters>/
- #188 <pistillate flowers> rachises <presence of indumentum>/
1 glabrous/
2 scabrous <rough to the touch with short, hard, rigid trichomes>/
3 scaberulous <minutely scabrous>/
4 pubescent <soft, short, dense trichomes>/
5 puberulent <minutely pubescent>/
6 velutinous <soft, short, dense, straight trichomes, velvety>/
velutinous <soft, short, dense, straight trichomes, velvety>/

7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #189. <pistillate inflorescences> bracts/
1. present/
2. absent/
- #190. <pistillate inflorescences> bracts <distinctive, general characters that serve to distinguish the taxon>/
- #191. <pistillate inflorescences> bracts <width>/
- mm wide/
- #192. <pistillate inflorescences> bracts <length>/
- mm long/
- #193. <pistillate inflorescences> bracteoles/
1. present/
2. absent/
- #194. <pistillate inflorescences> bracteoles <distinctive general characters that serve to distinguish the taxon>/
- #195. <pistillate inflorescences> bracteoles <width>/
- mm wide/
- #196. <pistillate inflorescences> bracteoles <length>/
- mm long/
- #197. <pistillate inflorescences> spathes <presence>/
1. present/
2. absent/
- #198. <pistillate inflorescences> spathes <distinctive, general characters that serve to distinguish the taxon>/
- #199. <pistillate inflorescences> spathes <width>/
- mm wide/
- #200. <pistillate inflorescences> spathes <length>/
- cm long/
- #201. <pistillate inflorescences> pedicels <length>/
- mm long/
- #202. flowers <distinctive, general characters that serve to distinguish the taxon>/
- #203. flowers <appearance>/
1. produced before leaves/
2. produced simultaneously with or after leaves <implicit>/
3. produced simultaneously with leaves/
- #204. flowers <fragrance>/
1. fragrant/
2. not fragrant/
- #205. flowers <description of odor if distinctive and serving to distinguish taxon, use odor as first word of phrase>/
- #206. flowers <whether perfect or not> <MANDATORY IF APPLICABLE>/
1. perfect/
2. imperfect/
3. neuter/
- #207. flowers <morphological form when perfect>/
1. all alike <implicit>/
2. of 2 morphological forms/
- #208. flowers <descriptors that describe 2 morphological forms of perfect flowers>/
- #209. flowers <morphological form when imperfect flowers present>/
1. staminate and pistillate similar/

2. staminate and pistillate different/
 3. perfect and staminate similar/
 4. perfect and staminate different/
 5. perfect and pistillate similar/
 6. perfect and pistillate different/
 7. perfect and neuter similar/
 8. perfect and neuter different/
 9. perfect and imperfect similar/
 10. perfect and imperfect different/
- #210. flowers <whether opening>/
1. chasmogamous <implicit>/
 2. cleistogamous/
- #211. <perfect flowers> perianths <presence> <MANDATORY IF APPLICABLE>/
1. absent/
 2. in 1-series/
 3. in 2-series/
- #212. <perfect flowers> perianths <symmetry when parts in ONE series> <MANDATORY IF APPLICABLE>/
1. radially symmetrical/
 2. bilaterally symmetrical/
- #213. <perfect flowers> perianths <distinctive, general characters that serve to distinguish the taxon>/
- #214. <perfect flowers> perianths <when in one series> <shape>/
1. campanulate/
 2. salverform/
 3. funnelform/
 4. tubular/
 5. bilabiate/
 6. ligulate/
 7. personate/
 8. papilionaceous/
 9. rotate/
 10. urceolate/
 11. bowl-shaped/
 12. saucer-shaped/
 13. flask-shaped/
- #215. <perfect flowers> perianth parts <when in one series> <number> <MANDATORY IF APPLICABLE>/
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #216. <perfect flowers> perianth parts <morphological forms> <when in one series>/
1. all alike <implicit>/
 2. of 2 morphological forms/
 3. of 3 morphological forms/
 4. of 4 morphological forms/
 5. of 5 morphological forms/
- #217. <perfect flowers> perianth parts <when in one series> <whether in whorls or spirals>/
1. whorled <implicit>/
 2. spiraled/
- #218. <perfect flowers> perianth parts <when in one series and whorled> - number of whorls/
1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
- #219. <perfect flowers> perianth parts <when in one series> <fusion> <MANDATORY IF APPLICABLE>/
1. free/
 2. fused/
- #220. <perfect flowers> perianth parts <when in one series> <specific color or colors that serve to distinguish the taxon> <MANDATORY IF APPLICABLE>/
- #221. <perfect flowers> perianth parts <when in one series>/
1. sepaloid/
 2. petaloid/
 3. fleshy/
 4. succulent/

5. cartilaginous <hard and tough, but flexible>/
 6. chartaceous <papery, opaque and thin>/
 7. coriaceous <leathery>/
 8. flaccid <lax and weak>/
 9. herbaceous <soft and succulent>/
 10. hyaline <thin and translucent or transparent>/
 11. indurate <hardened>/
 12. membranous <thin and semi-transparent>/
 13. scarious <thin and dry>/
- #222 <perfect flowers> perianth parts <shape>/
1. subulate/
 2. acicular/
 3. filiform/
 4. linear/
 5. lanceolate/
 6. oblanceolate/
 7. ovate/
 8. obovate/
 9. elliptic/
 10. oblong/
 11. spatulate/
 12. runcinate/
 13. pandurate/
 14. deltoid/
 15. obdeltoid/
 16. cordate/
 17. obcordate/
 18. reniform/
 19. sagittate/
 20. flabellate/
 21. orbicular/
 22. oval/
 23. ensiform/
- #223 <perfect flowers> perianth parts <width>/
mm wide/
- #224 <perfect flowers> perianth parts <length>/
mm long/
- #225 <perianth parts of perfect flowers> surfaces/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #226 <perianth parts of perfect flowers> venation/
1. parallel/
 2. parallel-convergent/
 3. pinnate/
 4. palmate/
 5. dichotomous/
 6. a single vein/
 7. not apparent/
 8. pinnipalmate/
- #227 <perianth parts of perfect flowers> indumentum/
1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes, velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #228 fibers <presence>/
1. present <Guilleminea>/

- 2 absent <implicit>/
- #229 <perianth parts of perfect flowers> apices/
- 1 aristate/
 - 2 caudate/
 - 3 acuminate/
 - 4 acute/
 - 5 cuspidate/
 - 6 mucronate/
 - 7 mucronulate/
 - 8 apiculate/
 - 9 obtuse/
 - 10 retuse/
 - 11 emarginate/
 - 12 attenuate/
 - 13 obcordate/
 - 14 truncate/
 - 15 rounded/
- #230 <perianth parts of perfect flowers> margins/
- 1 entire/
 - 2 undulate/
 - 3 sinuate/
 - 4 crenate/
 - 5 crenulate/
 - 6 erose/
 - 7 serrate/
 - 8 doubly serrate/
 - 9 serrulate/
 - 10 dentate/
 - 11 denticulate/
 - 12 incised/
 - 13 lacerate/
 - 14 lacinate/
 - 15 pinnately lobed/
 - 16 pinnately cleft/
 - 17 pinnately parted/
 - 18 palmately lobed/
 - 19 palmately cleft/
 - 20 palmately parted/
 - 21 pinnatifid/
 - 22 palmatifid/
 - 23 crispate/
 - 24 ciliate/
 - 25 spinose/
- #231 <perianth parts of perfect flowers> bases/
- 1 attenuate/
 - 2 cuneate/
 - 3 oblique/
 - 4 obtuse/
 - 5 truncate/
 - 6 cordate/
 - 7 hastate/
 - 8 auriculate/
 - 9 sagittate/
 - 10 rounded/
- #232 <perfect flowers> coronas <presence>/
- 1 present/
 - 2 absent <implicit>/
- #233 <perfect flowers> coronas <distinctive, general characters that serve to distinguish the taxon>/
- #234 <perfect flowers> calyces <distinctive, general characters that serve to distinguish the taxon>/
- #235 <perfect flowers> calyces <when perianth in two series> <symmetry>/
- 1 radially symmetrical <implicit>/
 - 2 bilaterally symmetrical/
- #236 <perfect flowers> calyces <when perianth in two series> <shape>/
- 1 campanulate/
 - 2 salverform/
 - 3 funnelform/
 - 4 tubular/
 - 5 bilabiate/
 - 6 ligulate/
 - 7 personate/
 - 8 papilionaceous/
 - 9 rotate/
 - 10 urceolate/
 - 11 bowl-shaped/
 - 12 saucer-shaped/
 - 13 flask-shaped/
- #237 <perfect flowers> sepals <number> <MANDATORY IF APPLICABLE>/
- 1 1/
 - 2 2/

3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
 13. absent/
 14. 0 <when giving number(s) for other taxa of family>/
- #238 <perfect flowers> sepals <morphological forms>/
1. all alike <implicit>/
 2. of 2 morphological forms/
 3. of 3 morphological forms/
 4. of 4 morphological forms/
 5. of 5 morphological forms/
- #239 <perfect flowers> sepals <distinctive, general characters that serve to distinguish the taxon>/
- #240 <perfect flowers> sepals <persistence>/
1. persistent <implicit>/
 2. caducous/
 3. deciduous/
- #241 <perfect flowers> sepals <whether in whorls or spirals>/
1. whorled <implicit>/
 2. spiraled/
- #242 <perfect flowers> sepals <number of whorls>/
1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
- #243 <perfect flowers> sepals <fusion> <MANDATORY IF APPLICABLE>/
1. free/
 2. fused/
- #244 <perfect flowers> sepals <special appearance or shape of individual sepals>/
1. gibbous/
 2. spurred/
 3. keeled/
 4. winged/
- #245 <perfect flowers> sepals/
1. appressed/
 2. ascending/
 3. spreading/
 4. reflexed/
 5. curled/
- #246 <perfect flowers> sepals <specific color or colors that serves to distinguish the taxon> <MANDATORY IF APPLICABLE>/
- #247 <perfect flowers> sepals/
1. herbaceous <implicit>/
 2. petaloid/
 3. fleshy/
 4. succulent/
 5. cartilaginous <hard and tough, but flexible>/
 6. chartaceous <papery, opaque and thin>/
 7. coriaceous <leathery>/
 8. flaccid <lax and weak>/
 9. hyaline <thin and translucent or transparent>/
 10. indurate <hardened>/
 11. membranous <thin and semi-transparent>/
 12. scarious <thin and dry>/
- #248 <perfect flowers> sepals <shape>/
1. subulate/
 2. acicular/
 3. filiform/
 4. linear/
 5. lanceolate/
 6. oblanceolate/
 7. ovate/
 8. obovate/
 9. elliptic/
 10. oblong/
 11. spatulate/
 12. runcinate/
 13. pandurate/
 14. deltoid/
 15. obdeltoid/
 16. cordate/
 17. obcordate/

18. reniform/
 19. sagittate/
 20. flabellate/
 21. orbicular/
 22. oval/
 23. ensiform/
- #249 <perfect flowers> sepals <width>/
 mm wide/
- #250 <perfect flowers> sepals <length>/
 mm long/
- #251 <sepals of perfect flowers> surfaces/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #252 <sepals perfect flowers> venation/
 1. parallel/
 2. parallel-convergent/
 3. pinnate/
 4. palmate/
 5. dichotomous/
 6. a single vein/
 7. not apparent/
 8. pinnipalmate/
- #253 <sepals of perfect flowers> indumentum/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes, velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
 18. glochidiate hairs/
- #254 <sepals of perfect flowers> apices/
 1. aristate/
 2. caudate/
 3. acuminate/
 4. acute/
 5. cuspidate/
 6. mucronate/
 7. mucronulate/
 8. apiculate/
 9. obtuse/
 10. retuse/
 11. emarginate/
 12. attenuate/
 13. obcordate/
 14. truncate/
 15. rounded/
- #255 <sepals of perfect flowers> margins/
 1. entire/
 2. undulate/
 3. sinuate/
 4. crenate/
 5. crenulate/
 6. erose/
 7. serrate/
 8. doubly serrate/
 9. serrulate/
 10. dentate/
 11. denticulate/

12. incised/
13. lacerate/
14. lacinate/
15. pinnately lobed/
16. pinnately cleft/
17. pinnately parted/
18. palmately lobed/
19. palmately cleft/
20. palmately parted/
21. pinnatifid/
22. palmatifid/
23. crispate/
24. ciliate/
25. spinose/

#256 <sepals of perfect flowers> bases/

1. attenuate/
2. cuneate/
3. oblique/
4. obtuse/
5. truncate/
6. cordate/
7. hastate/
8. auriculate/
9. sagittate/
10. rounded/

#257 <perfect flowers> sepal lobes/

1. appressed/
2. ascending/
3. spreading/
4. reflexed/
5. curled/

#258. <perfect flowers> sepal lobes <specific color or colors that serves to distinguish the taxon if different from fused portion> <MANDATORY IF APPLICABLE>/

#259 <perfect flowers> sepal lobes <if different from fused portion>/

1. herbaceous <implicit>/
2. petaloid/
3. fleshy/
4. succulent/
5. cartilaginous <hard and tough, but flexible>/
6. chartaceous <papery, opaque and thin>/
7. coriaceous <leathery>/
8. flaccid <lax and weak>/
9. hyaline <thin and translucent or transparent>/
10. indurate <hardened>/
11. membranous <thin and semi-transparent>/
12. scarious <thin and dry>/

#260 <perfect flowers> sepal lobes <shape>/

1. subulate/
2. acicular/
3. filiform/
4. linear/
5. lanceolate/
6. oblanceolate/
7. ovate/
8. obovate/
9. elliptic/
10. oblong/
11. spatulate/
12. runcinate/
13. pandurate/
14. deltoid/
15. obdeltoid/
16. cordate/
17. obcordate/
18. reniform/
19. sagittate/
20. flabellate/
21. orbicular/
22. oval/
23. ensiform/

#261. <perfect flowers> sepal lobes <width>/
mm wide/

#262 <perfect flowers> sepal lobes <length>/
mm long/

#263 <sepal lobes of perfect flowers> surfaces/

1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/

- 7 pustulate/
- 8 ribbed/
- 9 sulcate/

#264 <sepal lobes perfect flowers> venation/

- 1. parallel/
- 2. parallel-convergent/
- 3. pinnate/
- 4. palmate/
- 5. dichotomous/
- 6. a single vein/
- 7. not apparent/
- 8. pinnipalmate/

#265 <sepal lobes of perfect flowers> indumentum/

- 1. glabrous/
- 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
- 3. scaberulous <minutely scabrous>/
- 4. pubescent <soft, short, dense trichomes>/
- 5. puberulent <minutely pubescent>/
- 6. velutinous <soft, short, dense, straight trichomes, velvety>/
- 7. tomentose <soft, short, dense, matted trichomes>/
- 8. villous <soft, long, dense, curly, ascending trichomes>/
- 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
- 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
- 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
- 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
- 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
- 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
- 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
- 16. with glandular trichomes/
- 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#266 <sepal lobes of perfect flowers> apices/

- 1. aristate/
- 2. caudate/
- 3. acuminate/
- 4. acute/
- 5. cuspidate/
- 6. mucronate/
- 7. mucronulate/
- 8. apiculate/
- 9. obtuse/
- 10. retuse/
- 11. emarginate/
- 12. attenuate/
- 13. obcordate/
- 14. truncate/
- 15. rounded/

#267 <sepal lobes of perfect flowers> margins/

- 1. entire/
- 2. undulate/
- 3. sinuate/
- 4. crenate/
- 5. crenulate/
- 6. erose/
- 7. serrate/
- 8. doubly serrate/
- 9. serrulate/
- 10. dentate/
- 11. denticulate/
- 12. incised/
- 13. lacerate/
- 14. lacinate/
- 15. pinnately lobed/
- 16. pinnately cleft/
- 17. pinnately parted/
- 18. palmately lobed/
- 19. palmately cleft/
- 20. palmately parted/
- 21. pinnatifid/
- 22. palmatifid/
- 23. crispate/
- 24. ciliate/
- 25. spinose/

#268 <perfect flowers> corollas <distinctive, general characters that serve to distinguish the taxon>/

#269 <perfect flowers> corollas <symmetry> <MANDATORY IF APPLICABLE>/

- 1. radially symmetrical/
- 2. bilaterally symmetrical/

- #270 <perfect flowers> corollas <shape>/
1. campanulate/
 2. salverform/
 3. funnelform/
 4. tubular/
 5. bilabiate/
 6. ligulate/
 7. personate/
 8. papilionaceous/
 9. rotate/
 10. urceolate/
 11. bowl-shaped/
 12. saucer-shaped/
 13. flask-shaped/
- #271 <perfect flowers> corollas <aestivation>/
1. valvate/
 2. imbricate/
 3. convolute/
 4. plicate/
- #272 <perfect flowers> petals <number> <MANDATORY IF APPLICABLE>/
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
 13. absent/
 14. 0 <when giving number(s) for other taxa of family>/
- #273 <perfect flowers> petals <morphological forms>/
1. all alike <implicit>/
 2. of 2 morphological forms/
 3. of 3 morphological forms/
 4. of 4 morphological forms/
 5. of 5 morphological forms/
- #274 <perfect flowers> petals <distinctive, general characters that serve to distinguish the taxon>/
- #275 <perfect flowers> petals <persistence>/
1. persistent <implicit>/
 2. caducous/
- #276 <perfect flowers> petals <whether in whorls or spirals>/
1. whorled <implicit>/
 2. spiraled/
- #277 <perfect flowers> petals <number of whorls>/
1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
- #278 <perfect flowers> petals <fusion> <MANDATORY IF APPLICABLE>/
1. free/
 2. fused/
- #279 <perfect flowers> petals <clawed>/
1. clawed/
 2. not clawed/
- #280 <perfect flowers> petals <shape>/
1. spatulate/
 2. cucullate/
 3. linear/
 4. emarginate/
 5. bifid/
 6. rhomboid/
 7. deltoid/
 8. triangular/
 9. ovate/
 10. lanceolate/
 11. oblanceolate/
 12. obovate/
 13. oblong/
- #281 <perfect flowers> petals <special appearance or shape of individual petals>/
1. gibbous/
 2. spurred/
 3. keeled/
 4. winged/

#282 <perfect flowers> petals/

1. appressed/
2. ascending/
3. spreading/
4. reflexed/
5. curled/

#283 <perfect flowers> petals <specific color or colors that serves to distinguish the taxon> <MANDATORY IF APPLICABLE>/

#284 <perfect flowers> petals/

1. fleshy/
2. succulent/
3. cartilaginous <hard and tough, but flexible>/
4. chartaceous <papery, opaque and thin>/
5. coriaceous <leathery>/
6. flaccid <lax and weak>/
7. herbaceous <soft and succulent>/
8. hyaline <thin and translucent or transparent>/
9. indurate <hardened>/
10. membranous <thin and semi-transparent>/
11. scarious <thin and dry>/

#285 <perfect flowers> petals <shape>/

1. subulate/
2. acicular/
3. filiform/
4. linear/
5. lanceolate/
6. oblanceolate/
7. ovate/
8. obovate/
9. elliptic/
10. oblong/
11. spatulate/
12. runcinate/
13. pandurate/
14. deltoid/
15. obdeltoid/
16. cordate/
17. obcordate/
18. reniform/
19. sagittate/
20. flabellate/
21. orbicular/
22. oval/
23. ensiform/

#286 <perfect flowers> petals <width>/
mm wide/#287 <perfect flowers> petals <length>/
mm long/

#288 <petals of perfect flowers> surfaces/

1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/

#289 <petals of perfect flowers> venation/

1. parallel/
2. parallel-convergent/
3. pinnate/
4. palmate/
5. dichotomous/
6. a single vein/
7. not apparent/
8. pinnipalmate/

#290 <petals of perfect flowers> indumentum/

1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes, velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/

12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #291 <petals of perfect flowers> apices/
1. aristate/
 2. caudate/
 3. acuminate/
 4. acute/
 5. cuspidate/
 6. mucronate/
 7. mucronulate/
 8. apiculate/
 9. obtuse/
 10. retuse/
 11. emarginate/
 12. attenuate/
 13. obcordate/
 14. truncate/
 15. rounded/
- #292 <petals of perfect flowers> margins/
1. entire/
 2. undulate/
 3. sinuate/
 4. crenate/
 5. crenulate/
 6. erose/
 7. serrate/
 8. doubly serrate/
 9. serrulate/
 10. dentate/
 11. denticulate/
 12. incised/
 13. lacerate/
 14. lacinate/
 15. pinnately lobed/
 16. pinnately cleft/
 17. pinnately parted/
 18. palmately lobed/
 19. palmately cleft/
 20. palmately parted/
 21. pinnatifid/
 22. palmatifid/
 23. crispate/
 24. ciliate/
 25. spinose/
- #293 <petals of perfect flowers> bases/
1. attenuate/
 2. cuneate/
 3. oblique/
 4. obtuse/
 5. truncate/
 6. cordate/
 7. hastate/
 8. auriculate/
 9. sagittate/
 10. rounded/
- #294 <perfect flowers> petal lobes/
1. appressed/
 2. ascending/
 3. spreading/
 4. reflexed/
 5. curled/
- #295 <perfect flowers> petal lobes <specific color or colors that serves to distinguish the taxon if different from fused portion> <MANDATORY IF APPLICABLE>/
- #296 <perfect flowers> petal lobes <if different from fused portion>/
1. herbaceous <implicit>/
 2. petaloid/
 3. fleshy/
 4. succulent/
 5. cartilaginous <hard and tough, but flexible>/
 6. chartaceous <papery, opaque and thin>/
 7. coriaceous <leathery>/
 8. flaccid <lax and weak>/
 9. hyaline <thin and translucent or transparent>/
 10. indurate <hardened>/

11. membranous <thin and semi-transparent>/
 12. scarious <thin and dry>/
- #297 <perfect flowers> petal lobes <shape>/
 1. subulate/
 2. acicular/
 3. filiform/
 4. linear/
 5. lanceolate/
 6. oblanceolate/
 7. ovate/
 8. obovate/
 9. elliptic/
 10. oblong/
 11. spatulate/
 12. runcinate/
 13. pandurate/
 14. deltoid/
 15. obdeltoid/
 16. cordate/
 17. obcordate/
 18. reniform/
 19. sagittate/
 20. flabellate/
 21. orbicular/
 22. oval/
 23. ensiform/
- #298 <perfect flowers> petal lobes <width>/
 mm wide/
- #299 <perfect flowers> petal lobes <length>/
 mm long/
- #300 <petal lobes of perfect flowers> surfaces/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #301 <petal lobes perfect flowers> venation/
 1. parallel/
 2. parallel-convergent/
 3. pinnate/
 4. palmate/
 5. dichotomous/
 6. a single vein/
 7. not apparent/
 8. pinnipalmate/
- #302 <petal lobes of perfect flowers> indumentum/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes, velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 16. with glandular trichomes/
 17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #303 <petal lobes of perfect flowers> apices/
 1. aristate/
 2. caudate/
 3. acuminate/
 4. acute/
 5. cuspidate/
 6. mucronate/
 7. mucronulate/
 8. apiculate/

9. obtuse/
 10. retuse/
 11. emarginate/
 12. attenuate/
 13. obcordate/
 14. truncate/
 15. rounded/
- #304 <petal lobes of perfect flowers> margins/
1. entire/
 2. undulate/
 3. sinuate/
 4. crenate/
 5. crenulate/
 6. erose/
 7. serrate/
 8. doubly serrate/
 9. serrulate/
 10. dentate/
 11. denticulate/
 12. incised/
 13. lacerate/
 14. lacinate/
 15. pinnately lobed/
 16. pinnately cleft/
 17. pinnately parted/
 18. palmately lobed/
 19. palmately cleft/
 20. palmately parted/
 21. pinnatifid/
 22. palmatifid/
 23. crispate/
 24. ciliate/
 25. spinose/
- #305 <perfect flowers> androecia <distinctive, general characters that serve to distinguish the taxon>/
- #306 <perfect flowers> androecia <symmetry>/
1. radially symmetrical <implicit>/
 2. bilaterally symmetrical/
- #307 <perfect flowers> stamens <number> <MANDATORY IF APPLICABLE>/
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #308 <perfect flowers> stamens <distinctive, general characters that serve to distinguish the taxon>/
- #309 <perfect flowers> stamens <relation to petals>/
1. alternate with petals <implicit>/
 2. opposite the petals/
 3. both alternate with and opposite the petals/
- #310 <perfect flowers> stamens <relation to sepals when perianth parts in 1 series>/
1. alternate with sepals/
 2. opposite the sepals <implicit>/
 3. both alternate with and opposite the sepals/
- #311 <perfect flowers> stamens <whether in whorls or spirals>/
1. whorled <implicit>/
 2. spiraled/
- #312 <perfect flowers> stamens <number of whorls>/
1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
 4. in 4 or more whorls/
- #313 <perfect flowers> stamens <fascicles>/
1. fascicled/
 2. not fascicled <implicit>/
- #314 <perfect flowers> stamens <length>/
1. of equal length <implicit>/
 2. didynamous/
 3. tetradynamous/
 4. of 2 lengths/
 5. of 3 lengths/

- 6 of unequal lengths/
- #315 <perfect flowers> stamens <length relative to perianth>/
1. exerted beyond perianth/
 2. included within perianth/
 3. equalling perianth/
 4. both exerted beyond and included within perianth/
- #316 <perfect flowers> stamens <adnation>/
1. episepalous/
 2. epipetalous/
 3. fused to styles/
 4. fused to stigmas/
 5. fused to perianth parts/
 6. arising from receptacle <implicit>/
 7. fused to ovaries/
- #317 <perfect flowers> stamens <fusion>/
1. free <implicit>/
 2. fused by filaments/
 3. fused by anthers/
- #318 <perfect flowers> stamens <fusion>/
1. monadelphous <implicit>/
 2. diadelphous/
 3. polyadelphous/
 4. fused in fascicles/
- #319 <perfect flowers> stamens/
1. filamentous <implicit>/
 2. petaloid/
 3. laminar/
 4. appendicular/
- #320 <perfect flowers> stamens <length>/
- mm long/
- #321 <perfect flowers> anthers <distinctive, general characters that serve to distinguish the taxon>/
- #322 <perfect flowers> anthers <attachment to filament>/
1. versatile/
 2. dorsifixed/
 3. basifixed/
- #323 <perfect flowers> anthers <dehiscence>/
1. dehiscent longitudinally <implicit>/
 2. dehiscent poricidally/
 3. dehiscent transversely/
 4. dehiscent valvularly/
- #324 <perfect flowers> anthers <specific color or colors that serves to distinguish the taxon>/
- #325 <perfect flowers> anthers <specific shape that serves to distinguish the taxon>/
- #326 <perfect flowers> anthers <straightness>/
1. straight <implicit>/
 2. coiled/
 3. arcuate/
- #327 <perfect flowers> anthers <appendages>/
- #328 <perfect flowers> anthers <width>/
- mm wide/
- #329 <perfect flowers> anthers <length>/
- mm long/
- #330 <perfect flowers> theca <number per anther>/
1. 1/
 2. 2 <implicit>/
- #331 <perfect flowers> connective <distinctive, general characters that serve to distinguish the taxon>/
- #332 <perfect flowers> pollen <distinctive, general characters that serve to distinguish the taxon>/
- #333 <perfect flowers> pollen <aggregation>/
1. aggregated/
 2. not aggregated <implicit>/
- #334 <perfect flowers> pollen <if aggregated>/
1. in pollinia/
 2. not in pollinia <implicit>/
- #335 <perfect flowers> pollen <viscin threads>/
1. held by viscin threads/

2. not held by viscin threads <implicit>/
- #336. <perfect flowers> filaments <presence>/
 1. present <implicit>/
 2. absent/
- #337. <perfect flowers> filaments <distinctive, general characters that serve to distinguish the taxon>/
- #338. <perfect flowers> filaments <length>/
 mm long/
- #339. <perfect flowers> staminodia <presence>/
 1. present/
 2. absent <implicit>/
- #340. <perfect flowers> staminodia <number>/
- #341. <perfect flowers> staminodia <distinctive, general characters that serve to distinguish the taxon>/
- #342. <perfect flowers> gynoecia <distinctive, general characters that serve to distinguish the taxon>/
- #343. <perfect flowers> pistils <number> <MANDATORY IF APPLICABLE>/
 1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #344. <perfect flowers> pistils <distinctive, general characters that serve to distinguish the taxon>/
- #345. <perfect flowers> pistils <whether in whorls or spirals>/
 1. whorled <implicit>/
 2. spiraled/
- #346. <perfect flowers> pistils <number of whorls>/
 1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
 4. in 4 or more whorls/
- #347. <perfect flowers> pistils <number per whorl>/
 per whorl/
- #348. <perfect flowers> pistils <fusion>/
 1. free/
 2. fused by stigmas/
 3. fused by styles/
 4. fused by bases/
- #349. <perfect flowers> pistils <nature> <MANDATORY IF APPLICABLE>/
 1. simple/
 2. compound/
- #350. <perfect flowers> pistils <stipitate>/
 1. stipitate/
 2. sessile <implicit>/
- #351. <perfect flowers> pistils <overall length when diagnostic>/
 mm long/
- #352. <perfect flowers> stigmas <number per pistil> <MANDATORY IF APPLICABLE>/
 1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #353. <perfect flowers> stigmas <lobe number per stigma>/
 1. not lobed <implicit>/
 2. 2-lobed/
 3. 3-lobed/
 4. 4-lobed/

- 5 5-lobed/
6 6-lobed/
7 7- or more lobed/
- #354 <perfect flowers> stigmas <type>/
1 plumose/
2 capitate/
3 linear/
4 discoid/
5 clavate/
6 crested/
7 lineate/
8 fimbriate/
9 decurrent/
10 rounded/
11 peltate/
- #355 <perfect flowers> stigmas <distinctive, general characters that serve to distinguish the taxon>/
distinguish the taxon>/
- #356 <perfect flowers> stigmas <distinctive color or colors that serves to distinguish the taxon>/
distinguish the taxon>/
- #357 <perfect flowers> stigmas <length>/
mm long/
- #358 <perfect flowers> styles <presence>/
1 present <implicit>/
2 absent/
- #359 <perfect flowers> styles <number per pistil> <MANDATORY IF APPLICABLE>/
1 1/
2 2/
3 3/
4 4/
5 5/
6 6/
7 7/
8 8/
9 9/
10 10/
11 11/
12 numerous <give number(s) if known>/
13 absent/
14 0 <when giving number(s) of other taxa in family>/
- #360 <perfect flowers> styles <fusion when more than 1 present>/
1 free/
2 fused/
- #361 <perfect flowers> styles <distinctive, general characters that serve to distinguish the taxon>/
distinguish the taxon>/
- #362 <perfect flowers> styles <attachment>/
1 gynobasic/
2 apical <implicit>/
apical <implicit>/
- #363 <perfect flowers> styles <length relative to perianth>/
1 exserted beyond perianth/
2 included within perianth/
3 equalling perianth/
4 both exserted beyond and included within perianth/
- #364 <perfect flowers> styles <length>/
mm long/
- #365 <perfect flowers> stylopodia <presence>/
1 present/
2 absent <implicit>/
absent <implicit>/
- #366 <perfect flowers> ovaries <distinctive, general characters that serve to distinguish the taxon>/
distinguish the taxon>/
- #367 <perfect flowers> ovaries <position> <MANDATORY IF APPLICABLE>/
1 superior/
2 inferior/
- #368 <perfect flowers> ovaries <shape in longitudinal section>/
1 hemispherical in LS/
2 elliptical in LS/
3 cylindrical in LS/
4 ovoid in LS/
5 obovoid in LS/
- #369 <perfect flowers> ovaries <shape in cross-section>/
1 lobed in XS/
2 terete in XS/
3 flattened in XS/
4 elliptical in XS/
5 quadangular in XS/

6. triangular in XS/
7. lenticular in XS/
- #370. <perfect flowers> lobes <number of ovary lobes>/
1. 0 <not lobed>/
2. 2/
3. 3/
4. 4/
5. 5/
6. 6/
7. 7/
8. 8/
9. 9/
10. 10/
11. 11/
12. numerous <give number(s) if known>/
- #371. <perfect flowers> ovaries <width when flattened>/
mm wide/
- #372. <perfect flowers> ovaries <diameter when not flattened>/
mm in diameter/
- #373. <perfect flowers> ovaries <length>/
mm long/
- #374. <perfect flowers> carpels <number> <MANDATORY IF APPLICABLE>/
1. 1/
2. 2/
3. 3/
4. 4/
5. 5/
6. 6/
7. 7/
8. 8/
9. 9/
10. 10/
11. 11/
12. numerous <give number(s) if known>/
- #375. <perfect flowers> locules <number>/
1. 1/
2. 2/
3. 3/
4. 4/
5. 5/
6. 6/
7. 7/
8. 8/
9. 9/
10. 10/
11. 11/
12. numerous <give number(s) if known>/
- #376. <perfect flowers> placentation <type> <MANDATORY IF APPLICABLE>/
1. parietal/
2. axile/
3. free-central/
4. basal/
5. apical/
6. marginal/
- #377. <perfect flowers> ovules <total number> <when applicable>/
1. 1/
2. 2/
3. 3/
4. 4/
5. 5/
6. 6/
7. 7/
8. 8/
9. 9/
10. 10/
11. 11/
12. numerous <give number(s) if known>/
- #378. <perfect flowers> ovules <per locule> <when applicable>/
1. 1 per locule/
2. 2 per locule/
3. 3 per locule/
4. 4 per locule/
5. 5 per locule/
6. 6 per locule/
7. 7 per locule/
8. 8 per locule/
9. 9 per locule/
10. 10 per locule/
11. 11 per locule/
12. 12 or more per locule/

- #379 <perfect flowers> hypanthia <presence>/
 1. present/
 2. absent <implicit>/
- #380 <perfect flowers> hypanthia <distinctive, general characters that serve to distinguish the taxon>/
- #381 <perfect flowers> hypanthia <number of layers>/
 1. single <implicit>/
 2. double/
- #382 <perfect flowers> hypanthia <shape>/
 1. tubular/
 2. cup-shaped/
 3. annular <hypanthial disk>/
- #383 <perfect flowers> hypanthia <extension in flowers with inferior ovaries flowers>/
 1. extending beyond ovaries/
 2. not extending beyond ovaries/
- #384 <perfect flowers> hypanthia <origin>/
- #385 <perfect flowers> nectaries/
 1. present/
 2. absent <implicit>/
- #386 <perfect flowers> nectaries <number>/
 1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #387 <perfect flowers> nectaries <position>/
 1. sepaliferous/
 2. petaliferous/
 3. staminal/
 4. staminodal/
 5. on staminal disk/
 6. receptacular/
- #388 <perfect flowers> nectaries <distinctive, general characters that serve to distinguish the taxon>/
- #389 staminate flowers <presence>/
 1. present/
 2. absent/
- #390 <staminate flowers> perianths <similarities>/
 1. similar to those of perfect flowers/
 2. different from those of perfect flowers/
 3. similar to those of pistillate flowers/
 4. different from those of pistillate flowers/
- #391 <staminate flowers> perianths <presence>/
 1. absent/
 2. in 1-series/
 3. in 2-series/
- #392 <staminate flowers> perianths <when in ONE series> <symmetry> <MANDATORY IF APPLICABLE>/
 1. radially symmetrical/
 2. bilaterally symmetrical/
- #393 <staminate flowers> perianth <distinctive, general characters that serve to distinguish the taxon>/
- #394 <staminate flowers> perianths <when in one series> <shape>/
 1. campanulate/
 2. salverform/
 3. funnellform/
 4. tubular/
 5. bilabiate/
 6. ligulate/
 7. personate/
 8. papilionaceous/
 9. rotate/
 10. urceolate/
 11. bowl-shaped/
 12. saucer-shaped/
 13. flask-shaped/

- #395 <staminate flowers> perianth parts <when in one series> <number>
<MANDATORY IF APPLICABLE>/
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #396 <staminate flowers> perianth parts <morphological forms> <when in one series>/
1. all alike <implicit>/
 2. of 2 morphological forms/
 3. of 3 morphological forms/
 4. of 4 morphological forms/
 5. of 5 morphological forms/
- #397 <staminate flowers> perianth parts <when in one series> <whether in whorls or spirals>/
1. whorled <implicit>/
 2. spiraled/
- #398 <staminate flowers> perianth parts <when in one series and whorled>
<number of whorls>/
1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
- #399 <staminate flowers> perianth parts <when in one series> <fusion>
<MANDATORY IF APPLICABLE>/
1. free/
 2. fused/
- #400 <staminate flowers> perianth parts <when in one series> <specific color or colors that serves to distinguish the taxon> <MANDATORY IF APPLICABLE>/
- #401 <staminate flowers> perianth parts <when in one series>/
1. sepaloid/
 2. petaloid/
 3. membranous/
 4. chaffy/
 5. coriaceous/
 6. chartaceous/
 7. papery/
- #402 <staminate flowers> perianth parts <shape>/
1. subulate/
 2. acicular/
 3. filiform/
 4. linear/
 5. lanceolate/
 6. oblanceolate/
 7. ovate/
 8. obovate/
 9. elliptic/
 10. oblong/
 11. spatulate/
 12. runcinate/
 13. pandurate/
 14. deltoid/
 15. obdeltoid/
 16. cordate/
 17. obcordate/
 18. reniform/
 19. sagittate/
 20. flabellate/
 21. orbiculate/
 22. oval/
 23. ensiform/
- #403 <staminate flowers> perianth parts <width>/
- mm wide/
- #404 <staminate flowers> perianth parts <length>/
- mm long/
- #405 <perianth parts of staminate flowers> surfaces/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/

- 7 pustulate/
- 8 ribbed/
- 9 sulcate/

#406 <perianth parts of staminate flowers> venation/

- 1 parallel/
- 2 parallel-convergent/
- 3 pinnate/
- 4 palmate/
- 5 dichotomous/
- 6 a single vein/
- 7 not apparent/
- 8 pinnipalmate/

#407 <perianth parts of staminate flowers> indumentum/

- 1 glabrous/
- 2 scabrous <rough to the touch with short, hard, rigid trichomes>/
- 3 scaberulous <minutely scabrous>/
- 4 pubescent <soft, short, dense trichomes>/
- 5 puberulent <minutely pubescent>/
- 6 velutinous <soft, short, dense, straight trichomes, velvety>/
- 7 tomentose <soft, short, dense, matted trichomes>/
- 8 villous <soft, long, dense, curly, ascending trichomes>/
- 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
- 10 lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
- 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
- 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
- 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
- 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
- 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
- 16 with glandular trichomes/
- 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#408 <perianth parts of staminate flowers> apices/

- 1 aristate/
- 2 caudate/
- 3 acuminate/
- 4 acute/
- 5 cuspidate/
- 6 mucronate/
- 7 mucronulate/
- 8 apiculate/
- 9 obtuse/
- 10 retuse/
- 11 emarginate/
- 12 attenuate/
- 13 obcordate/
- 14 truncate/
- 15 rounded/

#409 <perianth parts of staminate flowers> margins/

- 1 entire/
- 2 undulate/
- 3 sinuate/
- 4 crenate/
- 5 crenulate/
- 6 erose/
- 7 serrate/
- 8 doubly serrate/
- 9 serrulate/
- 10 dentate/
- 11 denticulate/
- 12 incised/
- 13 lacerate/
- 14 lacinate/
- 15 pinnately lobed/
- 16 pinnately cleft/
- 17 pinnately parted/
- 18 palmately lobed/
- 19 palmately cleft/
- 20 palmately parted/
- 21 pinnatifid/
- 22 palmatifid/
- 23 crispate/
- 24 ciliate/
- 25 spinose/

#410 <perianth parts of staminate flowers> bases/

- 1 attenuate/
- 2 cuneate/
- 3 oblique/
- 4 obtuse/
- 5 truncate/

- 6. cordate/
 - 7. hastate/
 - 8. auriculate/
 - 9. sagittate/
 - 10. rounded/
- #411. <staminate flowers> coronas <presence>/
- 1. present/
 - 2. absent <implicit>/
- #412. <staminate flowers> coronas <distinctive, general characters that serve to distinguish the taxon>/
- #413. <staminate flowers> calyces <distinctive, general characters that serve to distinguish the taxon>/
- #414. <staminate flowers> calyces <symmetry>/
- 1. radially symmetrical <implicit>/
 - 2. bilaterally symmetrical/
- #415. <staminate flowers> calyces <shape>/
- 1. campanulate/
 - 2. salverform/
 - 3. funnelform/
 - 4. tubular/
 - 5. bilabiate/
 - 6. ligulate/
 - 7. personate/
 - 8. papilionaceous/
 - 9. rotate/
 - 10. urceolate/
 - 11. bowl-shaped/
 - 12. saucer-shaped/
 - 13. flask-shaped/
- #416. <staminate flowers> sepals <number> <MANDATORY IF APPLICABLE>/
- 1. 1/
 - 2. 2/
 - 3. 3/
 - 4. 4/
 - 5. 5/
 - 6. 6/
 - 7. 7/
 - 8. 8/
 - 9. 9/
 - 10. 10/
 - 11. 11/
 - 12. numerous <give number(s) if known>/
 - 13. absent/
 - 14. 0 <when giving number(s) for other taxa of family>/
- #417. <staminate flowers> sepals <morphological forms>/
- 1. all alike <implicit>/
 - 2. of 2 morphological forms/
 - 3. of 3 morphological forms/
 - 4. of 4 morphological forms/
 - 5. of 5 morphological forms/
- #418. <staminate flowers> sepals <distinctive, general characters that serve to distinguish the taxon>/
- #419. <staminate flowers> sepals <persistence>/
- 1. persistent <implicit>/
 - 2. caducous/
- #420. <staminate flowers> sepals <whether in whorls or spirals>/
- 1. whorled <implicit>/
 - 2. spiraled/
- #421. <staminate flowers> sepals <number of whorls>/
- 1. in 1 whorl <implicit>/
 - 2. in 2 whorls/
 - 3. in 3 whorls/
- #422. <staminate flowers> sepals <fusion> <MANDATORY IF APPLICABLE>/
- 1. free/
 - 2. fused/
- #423. <staminate flowers> sepals <special appearance or shape of individual sepals>/
- 1. gibbous/
 - 2. spurred/
 - 3. keeled/
 - 4. winged/
- #424. <staminate flowers> sepals/
- 1. appressed/
 - 2. ascending/
 - 3. spreading/
 - 4. reflexed/

5. curled/
- #425 <staminate flowers> sepals <specific color or colors that serves to distinguish the taxon>/
- #426 <staminate flowers> sepals/
- 1 herbaceous <implicit>/
 - 2 petaloid/
 - 3 fleshy/
 - 4 succulent/
 - 5 cartilaginous <hard and tough, but flexible>/
 - 6 chartaceous <papery, opaque and thin>/
 - 7 coriaceous <leathery>/
 - 8 flaccid <lax and weak>/
 - 9 hyaline <thin and translucent or transparent>/
 - 10 indurate <hardened>/
 - 11 membranous <thin and semi-transparent>/
 - 12 scarious <thin and dry>/
- #427 <staminate flowers> sepals <shape>/
- 1 subulate/
 - 2 acicular/
 - 3 filiform/
 - 4 linear/
 - 5 lanceolate/
 - 6 oblanceolate/
 - 7 ovate/
 - 8 obovate/
 - 9 elliptic/
 - 10 oblong/
 - 11 spatulate/
 - 12 runcinate/
 - 13 pandurate/
 - 14 deltoid/
 - 15 obdeltoid/
 - 16 cordate/
 - 17 obcordate/
 - 18 reniform/
 - 19 sagittate/
 - 20 flabellate/
 - 21 orbicular/
 - 22 oval/
 - 23 ensiform/
- #428 <staminate flowers> sepals <width>/
- mm wide/
- #429 <staminate flowers> sepals <length>/
- mm long/
- #430 <sepals of staminate flowers> surfaces/
- 1 smooth <implicit>/
 - 2 striate/
 - 3 rugose/
 - 4 punctate/
 - 5 alveolate/
 - 6 foveolate/
 - 7 pustulate/
 - 8 ribbed/
 - 9 sulcate/
- #431 <sepals of staminate flowers> venation/
- 1 parallel/
 - 2 parallel-convergent/
 - 3 pinnate/
 - 4 palmate/
 - 5 dichotomous/
 - 6 a single vein/
 - 7 not apparent/
 - 8 pinnipalmate/
- #432 <sepals of staminate flowers> indumentum/
- 1 glabrous/
 - 2 scabrous <rough to the touch with short, hard, rigid trichomes>/
 - 3 scaberulous <minutely scabrous>/
 - 4 pubescent <soft, short, dense trichomes>/
 - 5 puberulent <minutely pubescent>/
 - 6 velutinous <soft, short, dense, straight trichomes, velvety>/
 - 7 tomentose <soft, short, dense, matted trichomes>/
 - 8 villous <soft, long, dense, curly, ascending trichomes>/
 - 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 - 10 lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 - 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 - 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 - 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 - 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending,

- straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #433 <sepals of staminate flowers> apices/
1. aristate/
 2. caudate/
 3. acuminate/
 4. acute/
 5. cuspidate/
 6. mucronate/
 7. mucronulate/
 8. apiculate/
 9. obtuse/
 10. retuse/
 11. emarginate/
 12. attenuate/
 13. obcordate/
 14. truncate/
 15. rounded/
- #434 <sepals of staminate flowers> margins/
1. entire/
 2. undulate/
 3. sinuate/
 4. crenate/
 5. crenulate/
 6. erose/
 7. serrate/
 8. doubly serrate/
 9. serrulate/
 10. dentate/
 11. denticulate/
 12. incised/
 13. lacerate/
 14. lacinate/
 15. pinnately lobed/
 16. pinnately cleft/
 17. pinnately parted/
 18. palmately lobed/
 19. palmately cleft/
 20. palmately parted/
 21. pinnatifid/
 22. palmatifid/
 23. crispate/
 24. ciliate/
 25. spinose/
- #435 <sepals of staminate flowers> bases/
1. attenuate/
 2. cuneate/
 3. oblique/
 4. obtuse/
 5. truncate/
 6. cordate/
 7. hastate/
 8. auriculate/
 9. sagittate/
 10. rounded/
- #436 <staminate flowers> sepal lobes/
1. appressed/
 2. ascending/
 3. spreading/
 4. reflexed/
 5. curled/
- #437 <staminate flowers> sepal lobes <specific color or colors that serves to distinguish the taxon if different from fused portion> <MANDATORY IF APPLICABLE>/
- #438 <staminate flowers> sepal lobes <if different from fused portion>/
1. herbaceous <implicit>/
 2. petaloid/
 3. fleshy/
 4. succulent/
 5. cartilaginous <hard and tough, but flexible>/
 6. chartaceous <papery, opaque and thin>/
 7. coriaceous <leathery>/
 8. flaccid <lax and weak>/
 9. hyaline <thin and translucent or transparent>/
 10. indurate <hardened>/
 11. membranous <thin and semi-transparent>/
 12. scarious <thin and dry>/
- #439 <staminate flowers> sepal lobes <shape>/
1. subulate/

2. acicular/
3. filiform/
4. linear/
5. lanceolate/
6. oblanceolate/
7. ovate/
8. obovate/
9. elliptic/
10. oblong/
11. spatulate/
12. runcinate/
13. pandurate/
14. deltoid/
15. obdeltoid/
16. cordate/
17. obcordate/
18. reniform/
19. sagittate/
20. flabellate/
21. orbicular/
22. oval/
23. ensiform/

#440. <staminate flowers> sepal lobes <width>
mm wide/

#441. <staminate flowers> sepal lobes <length>
mm long/

#442. <sepal lobes of staminate flowers> surfaces/

1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/

#443. <sepal lobes staminate flowers> venation/

1. parallel/
2. parallel-convergent/
3. pinnate/
4. palmate/
5. dichotomous/
6. a single vein/
7. not apparent/
8. pinnipalmate/

#444. <sepal lobes of staminate flowers> indumentum/

1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes, velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#445. <sepal lobes of staminate flowers> apices/

1. aristate/
2. caudate/
3. acuminate/
4. acute/
5. cuspidate/
6. mucronate/
7. mucronulate/
8. apiculate/
9. obtuse/
10. retuse/
11. emarginate/
12. attenuate/
13. obcordate/

- 14 truncate/
15 rounded/
- #446 <sepal lobes of staminate flowers> margins/
1. entire/
2. undulate/
3. sinuate/
4. crenate/
5. crenulate/
6. erose/
7. serrate/
8. doubly serrate/
9. serrulate/
10. dentate/
11. denticulate/
12. incised/
13. lacerate/
14. lacinate/
15. pinnately lobed/
16. pinnately cleft/
17. pinnately parted/
18. palmately lobed/
19. palmately cleft/
20. palmately parted/
21. pinnatifid/
22. palmatifid/
23. crispate/
24. ciliate/
25. spinose/
- #447 <staminate flowers> corollas <distinctive, general characters that serve to distinguish the taxon>/
- #448 <staminate flowers> corollas <symmetry> <MANDATORY IF APPLICABLE>/
1. radially symmetrical/
2. bilaterally symmetrical/
- #449 <staminate flowers> corollas <shape>/
1. campanulate/
2. salverform/
3. funnelform/
4. tubular/
5. bilabiate/
6. ligulate/
7. personate/
8. papilionaceous/
9. rotate/
10. urceolate/
11. bowl-shaped/
12. saucer-shaped/
13. flask-shaped/
- #450 <staminate flowers> corollas <aestivation>/
1. valvate/
2. imbricate/
3. convolute/
4. plicate/
- #451 <staminate flowers> petals <number> <MANDATORY IF APPLICABLE>/
1. 1/
2. 2/
3. 3/
4. 4/
5. 5/
6. 6/
7. 7/
8. 8/
9. 9/
10. 10/
11. 11/
12. numerous <give number(s) if known>/
13. absent/
14. 0 <when giving number(s) for other taxa of family>/
- #452 <staminate flowers> petals <morphological forms>/
1. all alike <implicit>/
2. of 2 morphological forms/
3. of 3 morphological forms/
4. of 4 morphological forms/
5. of 5 morphological forms/
- #453 <staminate flowers> petals <distinctive, general characters that serve to distinguish the taxon>/
- #454 <staminate flowers> petals <persistence>/
1. persistent <implicit>/
2. caducous/
- #455 <staminate flowers> petals <whether in whorls or spirals>/
1. whorled <implicit>/

2. spiraled/
- #456. <staminate flowers> petals <number of whorls>/
 1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
- #457. <staminate flowers> petals <fusion> <MANDATORY IF APPLICABLE>/
 1. free/
 2. fused/
- #458. <staminate flowers> petals <clawed>/
 1. clawed/
 2. not clawed/
- #459. <staminate flowers> petals <shape>/
 1. spatulate/
 2. cucullate/
 3. linear/
 4. emarginate/
 5. bifid/
 6. rhomboid/
 7. deltoid/
 8. triangular/
 9. ovate/
 10. lanceolate/
 11. oblanceolate/
 12. obovate/
 13. oblong/
- #460. <staminate flowers> petals <special appearance or shape of individual petals>/
 1. gibbous/
 2. spurred/
 3. keeled/
 4. winged/
- #461. <staminate flowers> petals/
 1. appressed/
 2. ascending/
 3. spreading/
 4. reflexed/
 5. curled/
- #462. <staminate flowers> petals <specific color or colors that serves to distinguish the taxon> <MANDATORY IF APPLICABLE>/
- #463. <staminate flowers> petals/
 1. fleshy/
 2. succulent/
 3. cartilaginous <hard and tough, but flexible>/
 4. chartaceous <papery, opaque and thin>/
 5. coriaceous <leathery>/
 6. flaccid <lax and weak>/
 7. herbaceous <soft and succulent>/
 8. hyaline <thin and translucent or transparent>/
 9. indurate <hardened>/
 10. membranous <thin and semi-transparent>/
 11. scarious <thin and dry>/
- #464. <staminate flowers> petals <shape>/
 1. subulate/
 2. acicular/
 3. filiform/
 4. linear/
 5. lanceolate/
 6. oblanceolate/
 7. ovate/
 8. obovate/
 9. elliptic/
 10. oblong/
 11. spatulate/
 12. runcinate/
 13. pandurate/
 14. deltoid/
 15. obdeltoid/
 16. cordate/
 17. obcordate/
 18. reniform/
 19. sagittate/
 20. flabellate/
 21. orbicular/
 22. oval/
 23. ensiform/
- #465. <staminate flowers> petals <width>/
 mm wide/
- #466. <staminate flowers> petals <length>/
 mm long/

#467 <petals of staminate flowers> surfaces/

- 1 smooth <implicit>/
- 2 striate/
- 3 rugose/
- 4 punctate/
- 5 alveolate/
- 6 foveolate/
- 7 pustulate/
- 8 ribbed/
- 9 sulcate/

#468 <petals of staminate flowers> venation/

- 1 parallel/
- 2 parallel-convergent/
- 3 pinnate/
- 4 palmate/
- 5 dichotomous/
- 6 a single vein/
- 7 not apparent/
- 8 pinnipalmate/

#469 <petals of staminate flowers> indumentum/

- 1 glabrous/
- 2 scabrous <rough to the touch with short, hard, rigid trichomes>/
- 3 scaberulous <minutely scabrous>/
- 4 pubescent <soft, short, dense trichomes>/
- 5 puberulent <minutely pubescent>/
- 6 velutinous <soft, short, dense, straight trichomes, velvety>/
- 7 tomentose <soft, short, dense, matted trichomes>/
- 8 villous <soft, long, dense, curly, ascending trichomes>/
- 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
- 10 lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
- 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
- 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
- 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
- 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
- 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
- 16 with glandular trichomes/
- 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#470 <petals of staminate flowers> apices/

- 1 aristate/
- 2 caudate/
- 3 acuminate/
- 4 acute/
- 5 cuspidate/
- 6 mucronate/
- 7 mucronulate/
- 8 apiculate/
- 9 obtuse/
- 10 retuse/
- 11 emarginate/
- 12 attenuate/
- 13 obcordate/
- 14 truncate/
- 15 rounded/

#471 <petals of staminate flowers> margins/

- 1 entire/
- 2 undulate/
- 3 sinuate/
- 4 crenate/
- 5 crenulate/
- 6 erose/
- 7 serrate/
- 8 doubly serrate/
- 9 serrulate/
- 10 dentate/
- 11 denticulate/
- 12 incised/
- 13 lacerate/
- 14 lacinate/
- 15 pinnately lobed/
- 16 pinnately cleft/
- 17 pinnately parted/
- 18 palmately lobed/
- 19 palmately cleft/
- 20 palmately parted/
- 21 pinnatifid/
- 22 palmatifid/
- 23 crispate/
- 24 ciliate/

- 25 spinose/
- #472 <petals of staminate flowers> bases/
1. attenuate/
 2. cuneate/
 3. oblique/
 4. obtuse/
 5. truncate/
 6. cordate/
 7. hastate/
 8. auriculate/
 9. sagittate/
 10. rounded/
- #473 <staminate flowers> petal lobes/
1. appressed/
 2. ascending/
 3. spreading/
 4. reflexed/
 5. curled/
- #474 <staminate flowers> petal lobes <specific color or colors that serves to distinguish the taxon if different from fused portion> <MANDATORY IF APPLICABLE>/
- #475 <staminate flowers> petal lobes <if different from fused portion>/
1. herbaceous <implicit>/
 2. petaloid/
 3. fleshy/
 4. succulent/
 5. cartilaginous <hard and tough, but flexible>/
 6. chartaceous <papery, opaque and thin>/
 7. coriaceous <leathery>/
 8. flaccid <lax and weak>/
 9. hyaline <thin and translucent or transparent>/
 10. indurate <hardened>/
 11. membranous <thin and semi-transparent>/
 12. scarious <thin and dry>/
- #476 <staminate flowers> petal lobes <shape>/
1. subulate/
 2. acicular/
 3. filiform/
 4. linear/
 5. lanceolate/
 6. oblanceolate/
 7. ovate/
 8. obovate/
 9. elliptic/
 10. oblong/
 11. spatulate/
 12. runcinate/
 13. pandurate/
 14. deltoid/
 15. obdeltoid/
 16. cordate/
 17. obcordate/
 18. reniform/
 19. sagittate/
 20. flabellate/
 21. orbicular/
 22. oval/
 23. ensiform/
- #477 <staminate flowers> petal lobes <width>/
- mm wide/
- #478 <staminate flowers> petal lobes <length>/
- mm long/
- #479 <petal lobes of staminate flowers> surfaces/
1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #480 <petal lobes of staminate flowers> venation/
1. parallel/
 2. parallel-convergent/
 3. pinnate/
 4. palmate/
 5. dichotomous/
 6. a single vein/
 7. not apparent/
 8. pinnipalmate/

#481 <petal lobes of staminate flowers> indumentum/

1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes, velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#482 <petal lobes of staminate flowers> apices/

1. aristate/
2. caudate/
3. acuminate/
4. acute/
5. cuspidate/
6. mucronate/
7. mucronulate/
8. apiculate/
9. obtuse/
10. retuse/
11. emarginate/
12. attenuate/
13. obcordate/
14. truncate/
15. rounded/

#483 <petal lobes of staminate flowers> margins/

1. entire/
2. undulate/
3. sinuate/
4. crenate/
5. crenulate/
6. erose/
7. serrate/
8. doubly serrate/
9. serrulate/
10. dentate/
11. denticulate/
12. incised/
13. lacerate/
14. lacinate/
15. pinnately lobed/
16. pinnately cleft/
17. pinnately parted/
18. palmately lobed/
19. palmately cleft/
20. palmately parted/
21. pinnatifid/
22. palmatifid/
23. crispate/
24. ciliate/
25. spinose/

#484 <staminate flowers> androecia <distinctive, general characters that serve to distinguish the taxon>/

#485 <staminate flowers> androecia <symmetry>/

1. radially symmetrical <implicit>/
2. bilaterally symmetrical/

#486 <staminate flowers> stamens <number> <MANDATORY IF APPLICABLE>/

1. 1/
2. 2/
3. 3/
4. 4/
5. 5/
6. 6/
7. 7/
8. 8/
9. 9/
10. 10/
11. 11/

- 12 numerous <give number(s) if known>/
- #487 <staminate flowers> stamens <distinctive, general characters that serve to distinguish the taxon>/
- #488 <staminate flowers> stamens <relation to petals>/
- 1 alternate with petals <implicit>/
 - 2 opposite the petals/
 - 3 both alternate with and opposite the petals/
- #489 <staminate flowers> stamens <relation to sepals when perianth parts in 1 series>/
- 1 alternate with sepals/
 - 2 opposite the sepals <implicit>/
 - 3 both alternate with and opposite the sepals/
- #490 <staminate flowers> stamens <whether in whorls or spirals>/
- 1 whorled <implicit>/
 - 2 spiraled/
- #491 <staminate flowers> stamens <when in one series and whorled> <number of whorls>/
- 1 in 1 whorl <implicit>/
 - 2 in 2 whorls/
 - 3 in 3 whorls/
 - 4 in 4 or more whorls/
- #492 <staminate flowers> stamens <fascicles>/
- 1 fascicled/
 - 2 not fascicled <implicit>/
- #493 <staminate flowers> stamens <length>/
- 1 of equal length <implicit>/
 - 2 didynamous/
 - 3 tetradynamous/
- #494 <staminate flowers> stamens <length relative to perianth>/
- 1 exerted beyond perianth/
 - 2 included within perianth/
 - 3 equaling perianth/
 - 4 both exerted beyond and included within perianth/
- #495 <staminate flowers> stamens <adnation>/
- 1 episealous/
 - 2 epipetalous/
 - 3 fused to styles/
 - 4 fused to stigmas/
 - 5 fused to perianth parts/
 - 6 arising from receptacle <implicit>/
 - 7 fused to ovaries/
- #496 <staminate flowers> stamens <fusion>/
- 1 free <implicit>/
 - 2 fused by filaments/
 - 3 fused by anthers/
- #497 <staminate flowers> stamens <fusion>/
- 1 monadelphous <implicit>/
 - 2 diadelphous/
 - 3 polyadelphous/
 - 4 fused in fascicles/
- #498 <staminate flowers> stamens/
- 1 filamentous <implicit>/
 - 2 petaloid/
 - 3 laminar/
 - 4 appendicular/
- #499 <staminate flowers> stamens <length>/
- mm long/
- #500 <staminate flowers> anthers <distinctive, general characters that serve to distinguish the taxon>/
- #501 <staminate flowers> anthers <attachment to filament>/
- 1 versatile/
 - 2 dorsifixed/
 - 3 basifixed/
- #502 <staminate flowers> anthers <dehiscence>/
- 1 dehiscent longitudinally <implicit>/
 - 2 dehiscent poricidally/
 - 3 dehiscent transversely/
 - 4 dehiscent valvularly/
- #503 <staminate flowers> anthers <specific color or colors that serves to distinguish the taxon>/
- #504 <staminate flowers> anthers <specific shape that serves to distinguish the taxon>/

- #505 <staminate flowers> anthers <straightness>/
 1 straight <implicit>/
 2 coiled/
 3 arcuate/
- #506 <staminate flowers> anthers <appendages>/
- #507 <staminate flowers> anthers <width>/
 mm wide/
- #508 <staminate flowers> anthers <length>/
 mm long/
- #509 <staminate flowers> theca <number per anther>/
 1 1/
 2 2 <implicit>/
- #510 <staminate flowers> connective <distinctive, general characters that serve to distinguish the taxon>/
- #511 <staminate flowers> pollen <distinctive, general characters that serve to distinguish the taxon>/
- #512 <staminate flowers> pollen <aggregation>/
 1 aggregated/
 2 not aggregated <implicit>/
- #513 <staminate flowers> pollen <if aggregated>/
 1 in pollinia/
 2 not in pollinia <implicit>/
- #514 <staminate flowers> pollen <viscin threads>/
 1 held by viscin threads/
 2 not held by viscin threads <implicit>/
- #515 <staminate flowers> filaments <presence>/
 1 present <implicit>/
 2 absent/
- #516 <staminate flowers> filaments <distinctive, general characters that serve to distinguish the taxon>/
- #517 <staminate flowers> filaments <length>/
 mm long/
- #518 <staminate flowers> staminodia <presence>/
 1 present/
 2 absent <implicit>/
- #519 <staminate flowers> staminodia <number>/
- #520 <staminate flowers> staminodia <distinctive, general characters that serve to distinguish the taxon>/
- #521 <staminate flowers> gynoeceal rudiments <presence>/
 1 present/
 2 absent <implicit>/
- #522 <staminate flowers> gynoeceal rudiments <distinctive, general characters that serve to distinguish the taxon>/
- #523 <staminate flowers> hypanthia <presence>/
 1 present/
 2 absent <implicit>/
- #524 <staminate flowers> hypanthia <distinctive, general characters that serve to distinguish the taxon>/
- #525 <staminate flowers> hypanthia <number of layers>/
 1 single <implicit>/
 2 double/
- #526 <staminate flowers> hypanthia <shape>/
 1 tubular/
 2 cup-shaped/
 3 annular <hypanthial disk>/
- #527 <staminate flowers> hypanthia <extension in flowers with inferior ovaries>/
 1 extending beyond ovaries/
 2 not extending beyond ovaries/
- #528 <staminate flowers> hypanthia <origin>/
- #529 <staminate flowers> nectaries/
 1 present/
 2 absent <implicit>/
- #530 <staminate flowers> nectaries <number>/

1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #531 <staminate flowers> nectaries <distinctive, general characters that serve to distinguish the taxon>/
- #532 <staminate flowers> nectaries <position>/
1. sepaliferous/
 2. petaliferous/
 3. staminal/
 4. staminodal/
 5. on staminal disk/
 6. receptacular/
- #533. pistillate flowers <presence>/
1. present/
 2. absent/
- #534 <pistillate flowers> perianths <similarities>/
1. similar to those of perfect flowers/
 2. different from those of perfect flowers/
 3. similar to those of staminate flowers/
 4. different from those of staminate flowers/
- #535 <pistillate flowers> perianths <presence> <MANDATORY IF APPLICABLE>/
1. absent/
 2. in 1-series/
 3. in 2-series/
- #536 <pistillate flowers> perianths <when parts in ONE series> <symmetry> <MANDATORY IF APPLICABLE>/
1. radially symmetrical/
 2. bilaterally symmetrical/
- #537 <pistillate flowers> perianths <distinctive, general characters that serve to distinguish the taxon>/
- #538 <pistillate flowers> perianths <when in one series> <shape>/
1. campanulate/
 2. salverform/
 3. funnelform/
 4. tubular/
 5. bilabiate/
 6. ligulate/
 7. personate/
 8. papilionaceous/
 9. rotate/
 10. urceolate/
 11. bowl-shaped/
 12. saucer-shaped/
 13. flask-shaped/
- #539 <pistillate flowers> perianth parts <when in one series> <number> <MANDATORY IF APPLICABLE>/
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #540 <pistillate flowers> perianth parts <morphological forms> <when in one series>/
1. all alike <implicit>/
 2. of 2 morphological forms/
 3. of 3 morphological forms/
 4. of 4 morphological forms/
 5. of 5 morphological forms/
- #541 <pistillate flowers> perianth parts <when in one series> <whether in whorls or spirals>/
1. whorled <implicit>/
 2. spiraled/

- #542 <pistillate flowers> perianth parts <when in one series and whorled>
 <number of whorls>/
 1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
- #543 <pistillate flowers> perianth parts <when in one series> <fusion>
 <MANDATORY WHEN APPLICABLE>/
 1. free/
 2. fused/
- #544 <pistillate flowers> perianth parts <when in one series> <specific color
 or colors that serves to distinguish the taxon> <MANDATORY IF
 APPLICABLE>/
- #545 <pistillate flowers> perianth parts <when in one series>/
 1. sepaloid/
 2. petaloid/
 3. membranous/
 4. chaffy/
 5. coriaceous/
 6. chartaceous/
 7. papery/
- #546 <pistillate flowers> perianth parts <shape>/
 1. subulate/
 2. acicular/
 3. filiform/
 4. linear/
 5. lanceolate/
 6. oblanceolate/
 7. ovate/
 8. obovate/
 9. elliptic/
 10. oblong/
 11. spatulate/
 12. runcinate/
 13. pandurate/
 14. deltoid/
 15. obdeltoid/
 16. cordate/
 17. obcordate/
 18. reniform/
 19. sagittate/
 20. flabellate/
 21. orbicular/
 22. oval/
 23. ensiform/
- #547 <pistillate flowers> perianth parts <width>/
 mm wide/
- #548 <pistillate flowers> perianth parts <length>/
 mm long/
- #549 <perianth parts of pistillate flowers> surfaces/
 1. smooth <implicit>/
 2. striate/
 3. rugose/
 4. punctate/
 5. alveolate/
 6. foveolate/
 7. pustulate/
 8. ribbed/
 9. sulcate/
- #550 <perianth parts of pistillate flowers> venation/
 1. parallel/
 2. parallel-convergent/
 3. pinnate/
 4. palmate/
 5. dichotomous/
 6. a single vein/
 7. not apparent/
 8. pinnipalmate/
- #551 <perianth parts of pistillate flowers> indumentum/
 1. glabrous/
 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
 3. scaberulous <minutely scabrous>/
 4. pubescent <soft, short, dense trichomes>/
 5. puberulent <minutely pubescent>/
 6. velutinous <soft, short, dense, straight trichomes, velvety>/
 7. tomentose <soft, short, dense, matted trichomes>/
 8. villous <soft, long, dense, curly, ascending trichomes>/
 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes,
 silky>/
 10. lanate <soft, long, dense, matted, ascending, curly trichomes,
 woolly>/
 11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/

12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#552 <perianth parts of pistillate flowers> apices

1. aristate/
2. caudate/
3. acuminate/
4. acute/
5. cuspidate/
6. mucronate/
7. mucronulate/
8. apiculate/
9. obtuse/
10. retuse/
11. emarginate/
12. attenuate/
13. obcordate/
14. truncate/
15. rounded/

#553 <perianth parts of pistillate flowers> margins/

1. entire/
2. undulate/
3. sinuate/
4. crenate/
5. crenulate/
6. erose/
7. serrate/
8. doubly serrate/
9. serrulate/
10. dentate/
11. denticulate/
12. incised/
13. lacerate/
14. lacinate/
15. pinnately lobed/
16. pinnately cleft/
17. pinnately parted/
18. palmately lobed/
19. palmately cleft/
20. palmately parted/
21. pinnatifid/
22. palmatifid/
23. crispate/
24. ciliate/
25. spinose/

#554 <perianth parts of pistillate flowers> bases/

1. attenuate/
2. cuneate/
3. oblique/
4. obtuse/
5. truncate/
6. cordate/
7. hastate/
8. auriculate/
9. sagittate/
10. rounded/

#555 <pistillate flowers> coronas <presence>/

1. present/
2. absent <implicit>/

#556 <pistillate flowers> coronas <distinctive, general characters that serve to distinguish the taxon>/

#557 <pistillate flowers> calyces <distinctive, general characters that serve to distinguish the taxon>/

#558 <pistillate flowers> calyces <symmetry>/

1. radially symmetrical <implicit>/
2. bilaterally symmetrical/

#559 <pistillate flowers> calyces <shape>/

1. campanulate/
2. salverform/
3. funnellform/
4. tubular/
5. bilabiate/
6. ligulate/
7. personate/

- 8. papilionaceous/
 - 9. rotate/
 - 10. urceolate/
 - 11. bowl-shaped/
 - 12. saucer-shaped/
 - 13. flask-shaped/
- #560. <pistillate flowers> sepals <number> <MANDATORY IF APPLICABLE>/
- 1. 1/
 - 2. 2/
 - 3. 3/
 - 4. 4/
 - 5. 5/
 - 6. 6/
 - 7. 7/
 - 8. 8/
 - 9. 9/
 - 10. 10/
 - 11. 11/
 - 12. numerous <give number(s) if known>/
 - 13. absent/
 - 14. 0 <when giving number(s) for other taxa of family>/
- #561. <pistillate flowers> sepals <morphological forms>/
- 1. all alike <implicit>/
 - 2. of 2 morphological forms/
 - 3. of 3 morphological forms/
 - 4. of 4 morphological forms/
 - 5. of 5 morphological forms/
- #562. <pistillate flowers> sepals <persistence>/
- 1. persistent <implicit>/
 - 2. caducous/
- #563. <pistillate flowers> sepals <distinctive, general characters that serve to distinguish the taxon>/
- #564. <pistillate flowers> sepals <whether in whorls or spirals>/
- 1. whorled <implicit>/
 - 2. spiraled/
- #565. <pistillate flowers> sepals <number of whorls>/
- 1. in 1 whorl <implicit>/
 - 2. in 2 whorls/
 - 3. in 3 whorls/
- #566. <pistillate flowers> sepals <fusion> <MANDATORY IF APPLICABLE>/
- 1. free/
 - 2. fused/
- #567. <pistillate flowers> sepals <special appearance or shape of individual sepals>/
- 1. gibbous/
 - 2. spurred/
 - 3. keeled/
 - 4. winged/
- #568. <pistillate flowers> sepals/
- 1. appressed/
 - 2. ascending/
 - 3. spreading/
 - 4. reflexed/
 - 5. curled/
- #569. <pistillate flowers> sepals <specific color or colors that serves to distinguish the taxon>/
- #570. <pistillate flowers> sepals/
- 1. herbaceous <implicit>/
 - 2. petaloid/
 - 3. fleshy/
 - 4. succulent/
 - 5. cartilaginous <hard and tough, but flexible>/
 - 6. chartaceous <papery, opaque and thin>/
 - 7. coriaceous <leathery>/
 - 8. flaccid <lax and weak>/
 - 9. hyaline <thin and translucent or transparent>/
 - 10. indurate <hardened>/
 - 11. membranous <thin and semi-transparent>/
 - 12. scarious <thin and dry>/
- #571. <pistillate flowers> sepals <shape>/
- 1. subulate/
 - 2. acicular/
 - 3. filiform/
 - 4. linear/
 - 5. lanceolate/
 - 6. oblanceolate/
 - 7. ovate/
 - 8. obovate/

- 9 elliptic/
 - 10 oblong/
 - 11 spatulate/
 - 12 runcinate/
 - 13 pandurate/
 - 14 deltoid/
 - 15 obdeltoid/
 - 16 oordate/
 - 17 obcordate/
 - 18 reniform/
 - 19 sagittate/
 - 20 flabellate/
 - 21 orbicular/
 - 22 oval/
 - 23 ensiform/
- #572 <pistillate flowers> sepals <width>/
mm wide/
- #573 <pistillate flowers> sepals <length>/
mm long/
- #574 <sepals of pistillate flowers> surfaces/
- 1 smooth <implicit>/
 - 2 striate/
 - 3 rugose/
 - 4 punctate/
 - 5 alveolate/
 - 6 foveolate/
 - 7 pustulate/
 - 8 ribbed/
 - 9 sulcate/
- #575 <sepals of pistillate flowers> venation/
- 1 parallel/
 - 2 parallel-convergent/
 - 3 pinnate/
 - 4 palmate/
 - 5 dichotomous/
 - 6 a single vein/
 - 7 not apparent/
 - 8 pinnipalmate/
- #576 <sepals of pistillate flowers> indumentum/
- 1 glabrous/
 - 2 scabrous <rough to the touch with short, hard, rigid trichomes>/
 - 3 scaberulous <minutely scabrous>/
 - 4 pubescent <soft, short, dense trichomes>/
 - 5 puberulent <minutely pubescent>/
 - 6 velutinous <soft, short, dense, straight trichomes; velvety>/
 - 7 tomentose <soft, short, dense, matted trichomes>/
 - 8 villous <soft, long, dense, curly, ascending trichomes>/
 - 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 - 10 lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 - 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 - 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 - 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 - 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes; bristly>/
 - 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 - 16 with glandular trichomes/
 - 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #577 <sepals of pistillate flowers> apices/
- 1 aristate/
 - 2 caudate/
 - 3 acuminate/
 - 4 acute/
 - 5 cuspidate/
 - 6 mucronate/
 - 7 mucronulate/
 - 8 apiculate/
 - 9 obtuse/
 - 10 retuse/
 - 11 emarginate/
 - 12 attenuate/
 - 13 obcordate/
 - 14 truncate/
 - 15 rounded/
- #578 <sepals of pistillate flowers> margins/
- 1 entire/
 - 2 undulate/
 - 3 sinuate/

4. crenate/
5. crenulate/
6. erose/
7. serrate/
8. doubly serrate/
9. serrulate/
10. dentate/
11. denticulate/
12. incised/
13. lacerate/
14. lacinate/
15. pinnately lobed/
16. pinnately cleft/
17. pinnately parted/
18. palmately lobed/
19. palmately cleft/
20. palmately parted/
21. pinnatifid/
22. palmatifid/
23. crispate/
24. ciliate/
25. spinose/

#579. <sepals of pistillate flowers> bases/

1. attenuate/
2. cuneate/
3. oblique/
4. obtuse/
5. truncate/
6. cordate/
7. hastate/
8. auriculate/
9. sagittate/
10. rounded/

#580. <pistillate flowers> sepal lobes/

1. appressed/
2. ascending/
3. spreading/
4. reflexed/
5. curled/

#581. <pistillate flowers> sepal lobes <specific color or colors that serves to distinguish the taxon if different from fused portion> <MANDATORY IF APPLICABLE>/

#582. <pistillate flowers> sepal lobes <if different from fused portion>/

1. herbaceous <implicit>/
2. petaloid/
3. fleshy/
4. succulent/
5. cartilaginous <hard and tough, but flexible>/
6. chartaceous <papery, opaque and thin>/
7. coriaceous <leathery>/
8. flaccid <lax and weak>/
9. hyaline <thin and translucent or transparent>/
10. indurate <hardened>/
11. membranous <thin and semi-transparent>/
12. scarious <thin and dry>/

#583. <pistillate flowers> sepal lobes <shape>/

1. subulate/
2. acicular/
3. filiform/
4. linear/
5. lanceolate/
6. oblanceolate/
7. ovate/
8. obovate/
9. elliptic/
10. oblong/
11. spatulate/
12. runcinate/
13. pandurate/
14. deltoid/
15. obdeltoid/
16. cordate/
17. obcordate/
18. reniform/
19. sagittate/
20. flabellate/
21. orbicular/
22. oval/
23. ensiform/

#584. <pistillate flowers> sepal lobes <width>/
mm wide/

#585. <pistillate flowers> sepal lobes <length>/
mm long/

#586 <sepal lobes of pistillate flowers> surfaces/

1. smooth <implicit>/
2. striate/
3. rugose/
4. punctate/
5. alveolate/
6. foveolate/
7. pustulate/
8. ribbed/
9. sulcate/

#587 <sepal lobes pistillate flowers> venation/

1. parallel/
2. parallel-convergent/
3. pinnate/
4. palmate/
5. dichotomous/
6. a single vein/
7. not apparent/
8. pinnipalmate/

#588 <sepal lobes of pistillate flowers> indumentum/

1. glabrous/
2. scabrous <rough to the touch with short, hard, rigid trichomes>/
3. scaberulous <minutely scabrous>/
4. pubescent <soft, short, dense trichomes>/
5. puberulent <minutely pubescent>/
6. velutinous <soft, short, dense, straight trichomes, velvety>/
7. tomentose <soft, short, dense, matted trichomes>/
8. villous <soft, long, dense, curly, ascending trichomes>/
9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
11. pilose <soft, long, sparse, ascending, curly or straight trichomes>/
12. arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
13. hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
14. hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
15. strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
16. with glandular trichomes/
17. stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#589 <sepal lobes of pistillate flowers> apices/

1. aristate/
2. caudate/
3. acuminate/
4. acute/
5. cuspidate/
6. mucronate/
7. mucronulate/
8. apiculate/
9. obtuse/
10. retuse/
11. emarginate/
12. attenuate/
13. obcordate/
14. truncate/
15. rounded/

#590 <sepal lobes of pistillate flowers> margins/

1. entire/
2. undulate/
3. sinuate/
4. crenate/
5. crenulate/
6. erose/
7. serrate/
8. doubly serrate/
9. serrulate/
10. dentate/
11. denticulate/
12. incised/
13. lacerate/
14. lacinate/
15. pinnately lobed/
16. pinnately cleft/
17. pinnately parted/
18. palmately lobed/
19. palmately cleft/
20. palmately parted/
21. pinnatifid/
22. palmatifid/
23. crispate/
24. ciliate/

- 25 spinose/
- #591 <pistillate flowers> corollas <distinctive, general characters that serve to distinguish the taxon>/
- #592 <pistillate flowers> corollas <when perianth in two series> <symmetry>
<MANDATORY IF APPLICABLE>/
1. radially symmetrical/
 2. bilaterally symmetrical/
- #593 <pistillate flowers> corollas <shape>/
1. campanulate/
 2. salverform/
 3. funnelform/
 4. tubular/
 5. bilabiate/
 6. ligulate/
 7. personate/
 8. papilionaceous/
 9. rotate/
 10. urceolate/
 11. bowl-shaped/
 12. saucer-shaped/
 13. flask-shaped/
- #594 <pistillate flowers> corollas <aestivation>/
1. valvate/
 2. imbricate/
 3. convolute/
 4. plicate/
- #595 <pistillate flowers> petals <number> <MANDATORY IF APPLICABLE>/
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
 13. absent/
 14. 0 <when giving number(s) for other taxa of family>/
- #596 <pistillate flowers> petals <morphological forms>/
1. all alike <implicit>/
 2. of 2 morphological forms/
 3. of 3 morphological forms/
 4. of 4 morphological forms/
 5. of 5 morphological forms/
- #597 <pistillate flowers> petals <distinctive, general characters that serve to distinguish the taxon>/
- #598 <pistillate flowers> petals <persistence>/
1. persistent <implicit>/
 2. caducous/
- #599 <pistillate flowers> petals <whether in whorls or spirals>/
1. whorled <implicit>/
 2. spiraled/
- #600 <pistillate flowers> petals <number of whorls>/
1. in 1 whorl <implicit>/
 2. in 2 whorls/
 3. in 3 whorls/
- #601 <pistillate flowers> petals <fusion> <MANDATORY IF APPLICABLE>/
1. free/
 2. fused/
- #602 <pistillate flowers> petals <clawed>/
1. clawed/
 2. not clawed/
- #603 <pistillate flowers> petals <shape>/
1. spatulate/
 2. cucullate/
 3. linear/
 4. emarginate/
 5. bifid/
 6. rhomboid/
 7. deltoid/
 8. triangular/
 9. ovate/
 10. lanceolate/
 11. oblanceolate/

- 12. obovate/
- 13. oblong/

#604 <pistillate flowers> petals <special appearance or shape of individual petals>/

- 1. gibbous/
- 2. spurred/
- 3. keeled/
- 4. winged/

#605 <pistillate flowers> petals/

- 1. appressed/
- 2. ascending/
- 3. spreading/
- 4. reflexed/
- 5. curled/

#606 <pistillate flowers> petals <specific color or colors that serves to distinguish the taxon> <MANDATORY IF APPLICABLE>/

#607 <pistillate flowers> petals/

- 1. fleshy/
- 2. succulent/
- 3. cartilaginous <hard and tough, but flexible>/
- 4. chartaceous <papery, opaque and thin>/
- 5. coriaceous <leathery>/
- 6. flaccid <lax and weak>/
- 7. herbaceous <soft and succulent>/
- 8. hyaline <thin and translucent or transparent>/
- 9. indurate <hardened>/
- 10. membranous <thin and semi-transparent>/
- 11. scarious <thin and dry>/

#608 <pistillate flowers> petals <shape>/

- 1. subulate/
- 2. acicular/
- 3. filiform/
- 4. linear/
- 5. lanceolate/
- 6. oblanceolate/
- 7. ovate/
- 8. obovate/
- 9. elliptic/
- 10. oblong/
- 11. spatulate/
- 12. runcinate/
- 13. pandurate/
- 14. deltoid/
- 15. obdeltoid/
- 16. cordate/
- 17. obcordate/
- 18. reniform/
- 19. sagittate/
- 20. flabellate/
- 21. orbicular/
- 22. oval/
- 23. ensiform/

#609 <pistillate flowers> petals <width>/

mm wide/

#610 <pistillate flowers> petals <length>/

mm long/

#611 <petals of pistillate flowers> surfaces/

- 1. smooth <implicit>/
- 2. striate/
- 3. rugose/
- 4. punctate/
- 5. alveolate/
- 6. foveolate/
- 7. pustulate/
- 8. ribbed/
- 9. sulcate/

#612 <petals of pistillate flowers> venation/

- 1. parallel/
- 2. parallel-convergent/
- 3. pinnate/
- 4. palmate/
- 5. dichotomous/
- 6. a single vein/
- 7. not apparent/
- 8. pinnipalmate/

#613 <petals of pistillate flowers> indumentum/

- 1. glabrous/
- 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
- 3. scaberulous <minutely scabrous>/
- 4. pubescent <soft, short, dense trichomes>/

- 5 puberulent <minutely pubescent>/
- 6 velutinous <soft, short, dense, straight trichomes; velvety>/
- 7 tomentose <soft, short, dense, matted trichomes>/
- 8 villous <soft, long, dense, curly, ascending trichomes>/
- 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
- 10 lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
- 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
- 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
- 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
- 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
- 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
- 16 with glandular trichomes/
- 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#614 <petals of pistillate flowers> apices/

- 1 aristate/
- 2 caudate/
- 3 acuminate/
- 4 acute/
- 5 cuspidate/
- 6 mucronate/
- 7 mucronulate/
- 8 apiculate/
- 9 obtuse/
- 10 retuse/
- 11 emarginate/
- 12 attenuate/
- 13 obcordate/
- 14 truncate/
- 15 rounded/

#615 <petals of pistillate flowers> margins/

- 1 entire/
- 2 undulate/
- 3 sinuate/
- 4 crenate/
- 5 crenulate/
- 6 erose/
- 7 serrate/
- 8 doubly serrate/
- 9 serrulate/
- 10 dentate/
- 11 denticulate/
- 12 incised/
- 13 lacerate/
- 14 laciniate/
- 15 pinnately lobed/
- 16 pinnately cleft/
- 17 pinnately parted/
- 18 palmately lobed/
- 19 palmately cleft/
- 20 palmately parted/
- 21 pinnatifid/
- 22 palmatifid/
- 23 crispate/
- 24 ciliate/
- 25 spinose/

#616 <petals of pistillate flowers> bases/

- 1 attenuate/
- 2 cuneate/
- 3 oblique/
- 4 obtuse/
- 5 truncate/
- 6 cordate/
- 7 hastate/
- 8 auriculate/
- 9 sagittate/
- 10 rounded/

#617 <pistillate flowers> petal lobes/

- 1 appressed/
- 2 ascending/
- 3 spreading/
- 4 reflexed/
- 5 curled/

#618 <pistillate flowers> petal lobes <specific color or colors that serves to distinguish the taxon if different from fused portion> <MANDATORY IF APPLICABLE>/

#619 <pistillate flowers> petal lobes <if different from fused portion>/

- 1 herbaceous <implicit>/

- 2 petaloid/
 - 3 fleshy/
 - 4 succulent/
 - 5 cartilaginous <hard and tough, but flexible>/
 - 6 chartaceous <papery, opaque and thin>/
 - 7 coriaceous <leathery>/
 - 8 flaccid <lax and weak>/
 - 9 hyaline <thin and translucent or transparent>/
 - 10 indurate <hardened>/
 - 11 membranous <thin and semi-transparent>/
 - 12 scarious <thin and dry>/
- #620 <pistillate flowers> petal lobes <shape>/
- 1 subulate/
 - 2 acicular/
 - 3 filiform/
 - 4 linear/
 - 5 lanceolate/
 - 6 oblanceolate/
 - 7 ovate/
 - 8 obovate/
 - 9 elliptic/
 - 10 oblong/
 - 11 spatulate/
 - 12 runcinate/
 - 13 pandurate/
 - 14 deltoid/
 - 15 obdeltoid/
 - 16 cordate/
 - 17 obcordate/
 - 18 reniform/
 - 19 sagittate/
 - 20 flabellate/
 - 21 orbicular/
 - 22 oval/
 - 23 ensiform/
- #621 <pistillate flowers> petal lobes <width>/
mm wide/
- #622 <pistillate flowers> petal lobes <length>/
mm long/
- #623 <petal lobes of pistillate flowers> surfaces/
- 1 smooth <implicit>/
 - 2 striate/
 - 3 rugose/
 - 4 punctate/
 - 5 alveolate/
 - 6 foveolate/
 - 7 pustulate/
 - 8 ribbed/
 - 9 sulcate/
- #624 <petal lobes of pistillate flowers> venation/
- 1 parallel/
 - 2 parallel-convergent/
 - 3 pinnate/
 - 4 palmate/
 - 5 dichotomous/
 - 6 a single vein/
 - 7 not apparent/
 - 8 pinnipalmate/
- #625 <petal lobes of pistillate flowers> indumentum/
- 1 glabrous/
 - 2 scabrous <rough to the touch with short, hard, rigid trichomes>/
 - 3 scaberulous <minutely scabrous>/
 - 4 pubescent <soft, short, dense trichomes>/
 - 5 puberulent <minutely pubescent>/
 - 6 velutinous <soft, short, dense, straight trichomes, velvety>/
 - 7 tomentose <soft, short, dense, matted trichomes>/
 - 8 villous <soft, long, dense, curly, ascending trichomes>/
 - 9 sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
 - 10 lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/
 - 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 - 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 - 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 - 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 - 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 - 16 with glandular trichomes/
 - 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/

#626 <petal lobes of pistillate flowers> apices/

1. aristate/
2. caudate/
3. acuminate/
4. acute/
5. cuspidate/
6. mucronate/
7. mucronulate/
8. apiculate/
9. obtuse/
10. retuse/
11. emarginate/
12. attenuate/
13. obcordate/
14. truncate/
15. rounded/

#627 <petal lobes of pistillate flowers> margins/

1. entire/
2. undulate/
3. sinuate/
4. crenate/
5. crenulate/
6. erose/
7. serrate/
8. doubly serrate/
9. serrulate/
10. dentate/
11. denticulate/
12. incised/
13. lacerate/
14. lacinate/
15. pinnately lobed/
16. pinnately cleft/
17. pinnately parted/
18. palmately lobed/
19. palmately cleft/
20. palmately parted/
21. pinnatifid/
22. palmatifid/
23. crispate/
24. ciliate/
25. spinose/

#628 <pistillate flowers> androecial rudiments <presence>/

1. present/
2. absent <implicit>/

#629 <pistillate flowers> androecial rudiments <distinctive, general characters that serve to distinguish the taxon>/

#630 <pistillate flowers> gynoecia <distinctive, general characters that serve to distinguish the taxon>/

#631 <pistillate flowers> pistils <number> <MANDATORY IF APPLICABLE>/

1. 1/
2. 2/
3. 3/
4. 4/
5. 5/
6. 6/
7. 7/
8. 8/
9. 9/
10. 10/
11. 11/
12. numerous <give number(s) if known>/

#632 <pistillate flowers> pistils <distinctive, general characters that serve to distinguish the taxon>/

#633 <pistillate flowers> pistils <whether in whorls or spirals>/

1. whorled <implicit>/
2. spiraled/

#634 <pistillate flowers> pistils <when in one series and whorled> <number of whorls>/

1. in 1 whorl <implicit>/
2. in 2 whorls/
3. in 3 whorls/
4. in 4 or more whorls/

#635 <pistillate flowers> pistils <number per whorl>/

#636 <pistillate flowers> pistils <fusion>/

1. free/
2. fused by stigmas/
3. fused by styles/
4. fused by bases/

- #637 <pistillate flowers> pistils <nature> <MANDATORY IF APPLICABLE>/
 1 simple/
 2 compound/
- #638 <pistillate flowers> pistils <stipitate>/
 1 stipitate/
 2 sessile <implicit>/
- #639 <pistillate flowers> pistils <overall length when diagnostic>/
 mm long/
- #640 <pistillate flowers> stigmas <number per pistil> <MANDATORY IF APPLICABLE>/
 1 1/
 2 2/
 3 3/
 4 4/
 5 5/
 6 6/
 7 7/
 8 8/
 9 9/
 10 10/
 11 11/
 12 numerous <give number(s) if known>/
- #641 <pistillate flowers> stigmas <lobe number per stigma>/
 1 not lobed <implicit>/
 2 2-lobed/
 3 3-lobed/
 4 4-lobed/
 5 5-lobed/
 6 6-lobed/
 7 7- or more lobed/
- #642 <pistillate flowers> stigmas <type>/
 1 plumose/
 2 capitate/
 3 linear/
 4 discoid/
 5 clavate/
 6 crested/
 7 lineate/
 8 fimbriate/
 9 decurrent/
 10 rounded/
 11 peltate/
- #643 <pistillate flowers> stigmas <distinctive, general characters that serve to distinguish the taxon>/
- #644 <pistillate flowers> stigmas <distinctive color or colors that serves to distinguish the taxon>/
- #645 <pistillate flowers> stigmas <length>/
 mm long/
- #646 <pistillate flowers> styles <presence>/
 1 present <implicit>/
 2 absent/
- #647 <pistillate flowers> styles <number per pistil> <MANDATORY IF APPLICABLE>/
 1 1/
 2 2/
 3 3/
 4 4/
 5 5/
 6 6/
 7 7/
 8 8/
 9 9/
 10 10/
 11 11/
 12 numerous <give numbers if known>/
 13 absent/
 14 0 <when giving number(s) for other taxa in family>/
- #648 <pistillate flowers> styles <fusion when more than 1 present>/
 1 free/
 2 fused/
- #649 <pistillate flowers> styles <distinctive, general characters that serve to distinguish the taxon>/
- #650 <pistillate flowers> styles <attachment>/
 1 gynobasic/
 2 apical <implicit>/
- #651 <pistillate flowers> styles <length relative to perianth>/

1. exserted beyond perianth/
 2. included within perianth/
 3. equalling perianth/
 4. both exserted beyond and included within perianth/
- #652 <pistillate flowers> styles <length>/
mm long/
- #653 <pistillate flowers> stylopodia <presence>/
1. present/
 2. absent/
- #654 <pistillate flowers> ovaries <distinctive, general characters that serve to distinguish the taxon>/
- #655 <pistillate flowers> ovaries <position> <MANDATORY IF APPLICABLE>/
1. superior/
 2. inferior/
- #656 <pistillate flowers> ovaries <shape in longitudinal section>/
1. hemispherical in LS/
 2. elliptical in LS/
 3. cylindrical in LS/
 4. ovoid in LS/
 5. obovoid in LS/
- #657 <pistillate flowers> ovaries <shape in cross-section>/
1. lobed in XS/
 2. terete in XS/
 3. flattened in XS/
 4. elliptical in XS/
 5. quadangular in XS/
 6. triangular in XS/
 7. lenticular in XS/
- #658 <pistillate flowers> lobes <number of ovary lobes>/
1. 0 <not lobed>/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #659 <pistillate flowers> ovaries <width when flattened>/
mm wide/
- #660 <pistillate flowers> ovaries <diameter when not flattened>/
mm in diameter/
- #661 <pistillate flowers> ovaries <length>/
mm long/
- #662 <pistillate flowers> carpels <number> <MANDATORY IF APPLICABLE>/
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #663 <pistillate flowers> locules <number>/
1. 1/
 2. 2/
 3. 3/
 4. 4/
 5. 5/
 6. 6/
 7. 7/
 8. 8/
 9. 9/
 10. 10/
 11. 11/
 12. numerous <give number(s) if known>/
- #664 <pistillate flowers> placentation <type> <MANDATORY IF APPLICABLE>/
1. parietal/
 2. axile/
 3. free-central/

- 4. basal/
 - 5. apical/
 - 6. marginal/
- #665. <pistillate flowers> ovules <total number> <when applicable>/
- 1. 1/
 - 2. 2/
 - 3. 3/
 - 4. 4/
 - 5. 5/
 - 6. 6/
 - 7. 7/
 - 8. 8/
 - 9. 9/
 - 10. 10/
 - 11. 11/
 - 12. numerous <give number(s) if known>/
- #666. <pistillate flowers> ovules <per locule> <when applicable>/
- 1. 1 per locule/
 - 2. 2 per locule/
 - 3. 3 per locule/
 - 4. 4 per locule/
 - 5. 5 per locule/
 - 6. 6 per locule/
 - 7. 7 per locule/
 - 8. 8 per locule/
 - 9. 9 per locule/
 - 10. 10 per locule/
 - 11. 11 per locule/
 - 12. 12 or more per locule/
- #667. <pistillate flowers> hypanthia <presence>/
- 1. present/
 - 2. absent <implicit>/
- #668. <pistillate flowers> hypanthia <distinctive, general characters that serve to distinguish the taxon>/
- #669. <pistillate flowers> hypanthia <number of layers>/
- 1. single <implicit>/
 - 2. double/
- #670. <pistillate flowers> hypanthia <shape>/
- 1. tubular/
 - 2. cup-shaped/
 - 3. annular <hypanthial disk>/
- #671. <pistillate flowers> hypanthia <extension in epigynous flowers>/
- 1. extending beyond ovaries/
 - 2. not extending beyond ovaries/
- #672. <pistillate flowers> hypanthia <origin>/
- #673. <pistillate flowers> nectaries/
- 1. present/
 - 2. absent <implicit>/
- #674. <pistillate flowers> nectaries <number>/
- 1. 1/
 - 2. 2/
 - 3. 3/
 - 4. 4/
 - 5. 5/
 - 6. 6/
 - 7. 7/
 - 8. 8/
 - 9. 9/
 - 10. 10/
 - 11. 11/
 - 12. numerous <give number(s) if known>/
- #675. <pistillate flowers> nectaries <distinctive, general characters that serve to distinguish the taxon>/
- #676. <pistillate flowers> nectaries <position>/
- 1. sepaliferous/
 - 2. petaliferous/
 - 3. staminodal/
 - 4. on staminal disk/
 - 5. receptacular/
- #677. <neuter flowers> <presence>/
- 1. present/
 - 2. absent <implicit>/
- #678. <neuter flowers> perianth parts <similarities>/
- 1. similar to those of perfect flowers/
 - 2. different from those of perfect flowers/
 - 3. similar to those of staminate flowers/

- 4. different from those of perfect flowers/
- 5. similar to those of pistillate flowers/
- 6. different from those of pistillate flowers/

#679. fruits <type> <MANDATORY IF APPLICABLE>/

- 1. achenes/
- 2. samaras/
- 3. caryopses <grains>/
- 4. capsules/
- 5. legumes/
- 6. berries/
- 7. drupes/
- 8. hesperidia/
- 9. pepos/
- 10. nuts/
- 11. nutlets/
- 12. utricles/
- 13. follicles/
- 14. siliques/
- 15. silicles/
- 16. aggregates of drupelets/
- 17. aggregates of achenes/
- 18. aggregates of follicles/
- 19. multiple fruits/
- 20. schizocarps/
- 21. pomes/
- 22. accessory/

#680. fruits <distinctive, general characters that serve to distinguish the taxon>/

#681. fruits <dehiscence>/

- 1. dehiscent/
- 2. indehiscent/

#682. fruits <type of dehiscence> <when capsules>/

- 1. septicidal/
- 2. loculicidal/
- 3. poricidal/
- 4. circumscissile/
- 5. denticidal/
- 6. basiscidal/
- 7. valvate/
- 8. opening irregularly/

#683. fruits <presence of wings>/

- 1. wings present/
- 2. wings absent <implicit>/

#684. fruits <shape>/

- 1. capitate/
- 2. clavate/
- 3. compressed/
- 4. conical/
- 5. cylindrical/
- 6. discoid/
- 7. falcate/
- 8. fusiform/
- 9. lenticular/
- 10. ovoid/
- 11. plano-convex/
- 12. terete/
- 13. trigonous/
- 14. umbonate/
- 15. subglobose/

#685. fruits <width when flattened>/

- mm wide/

#686. fruits <diameter>/

- mm in diameter/

#687. fruits <length>/

- mm long/

#688. fruits <specific color or colors that serves to distinguish the taxon>/

#689. fruits <presence of indumentum>/

- 1. glabrous/
- 2. scabrous <rough to the touch with short, hard, rigid trichomes>/
- 3. scaberulous <minutely scabrous>/
- 4. pubescent <soft, short, dense trichomes>/
- 5. puberulent <minutely pubescent>/
- 6. velutinous <soft, short, dense, straight trichomes, velvety>/
- 7. tomentose <soft, short, dense, matted trichomes>/
- 8. villous <soft, long, dense, curly, ascending trichomes>/
- 9. sericeous <soft, long, dense or sparse, appressed, straight trichomes, silky>/
- 10. lanate <soft, long, dense, matted, ascending, curly trichomes, woolly>/

- 11 pilose <soft, long, sparse, ascending, curly or straight trichomes>/
 - 12 arachnoid <soft, very long, dense, thin, loosely entangled trichomes, cobwebby>/
 - 13 hirsute <stiff, long, dense or sparse, erect or ascending, straight trichomes>/
 - 14 hispid <stiff, long, tapered, dense or sparse, erect or ascending, straight trichomes, bristly>/
 - 15 strigose <stiff, long, sharp, bulbous base, dense or sparse, appressed, straight or curved trichomes>/
 - 16 with glandular trichomes/
 - 17 stellate <trichomes with branches radiating from base or separate hairs aggregated into star-like clusters>/
- #690 pericarp <distinctive, general characters that serve to distinguish the taxon>/
- #691 seeds <distinctive, general characters that serve to distinguish the taxon>/
- #692 seeds <number> <MANDATORY IF APPLICABLE>/
- 1 1/
 - 2 2/
 - 3 3/
 - 4 4/
 - 5 5/
 - 6 6/
 - 7 7/
 - 8 8/
 - 9 9/
 - 10 10/
 - 11 11/
 - 12 numerous <give number(s) if known>/
- #693 seeds <aril>/
- 1 with arils/
 - 2 without arils <implicit>/
- #694 seeds <presence of wings>/
- 1 wing present/
 - 2 wings absent <implicit>/
- #695 seeds <specific color or colors that serves to distinguish the taxon>/
- #696 seeds <presence of hairs>/
- 1 with hairs/
 - 2 without hairs <implicit>/
- #697 seeds <width>/
- mm wide/
- #698 seeds <diameter>/
- mm in diameter/
- #699 seeds <length>/
- mm long/
- #700 seeds <surface>/
- 1 smooth/
 - 2 glaucous <waxy covering>/
 - 3 echinate <stout prickles>/
 - 4 farinaceous <mealy covering>/
 - 5 glandular <covered with secretory structures>/
 - 6 muricate <short, hard protuberances, bumpy>/
 - 7 resinous <yellowish, sticky exudate>/
 - 8 scabrous <roughened by short, pointed projections>/
 - 9 scurfy <mealy, small bran-like scales>/
 - 10 tuberculate <warty, small swellings>/
 - 11 punctate <dented, pitted, minute impressions or depressions>/
 - 12 pulverulent <dusty or powdery>/
 - 13 rugose <wrinkled or venation impressed into the surface>/
 - 14 sulcate <longitudinal grooves>/
 - 15 winged <flat extension>/
 - 16 alveolate <pitted surface with pits separated by thin partitions, honey-combed>/
 - 17 ridged/
 - 18 ribbed/
 - 19 pustulate <minute blisters>/
 - 20 striate <longitudinal lines>/
- #701 seeds <appearance>/
- 1 lustrous/
 - 2 shining/
 - 3 dull/
 - 4 not lustrous/
 - 5 not shining/
- #702 seeds <shape>/
- 1 ovoid/
 - 2 lenticular/
 - 3 trigonous/

4. conical/
 5. fusiform/
 6. cochleate <snail-shaped>/
 7. compressed/
 8. discoid/
 9. falcate/
 10. botuliform/
 11. umbronnate/
- #703. pollen cones <position on plant in gymnosperms>/
1. terminal/
 2. axillary/
 3. nodal/
 4. borne on spurs <Ginkgo>/
- #704. pollen cones <distinctive, general characters that serve to distinguish the taxon>/
- #705. <pollen cones> microsporophylls <arrangement>/
1. overlapping/
 2. opposite/
- #706. <pollen cones> microsporophylls <distinctive, general characters that serve to distinguish the taxon>/
- #707. <pollen cones> microsporangia <number>/
1. 1 per microsporophyll/
 2. 2 per microsporophyll/
 3. 3 per microsporophyll/
 4. 4 per microsporophyll/
 5. 5 per microsporophyll/
 6. 6 per microsporophyll/
 7. 7 per microsporophyll/
 8. 8 per microsporophyll/
 9. 9 per microsporophyll/
 10. 10 per microsporophyll/
- #708. <pollen cones> microsporangia <distinctive, general characters that serve to distinguish the taxon>/
- #709. <pollen cones> pollen <distinctive, general characters that serve to distinguish the taxon>/
- #710. seed cones <presence>/
1. present/
 2. absent, ovules 2, each subtended by collar, terminating peduncle arising from leafy spur branch <Ginkgo>/
- #711. seed cones <distinctive, general characters that serve to distinguish the taxon>/
- #712. seed cones <position on plant in gymnosperms>/
1. terminal/
 2. axillary/
 3. nodal/
- #713. seed cones <shape>/
1. globose/
 2. conical/
 3. ovate/
 4. elliptic/
- #714. seed cones <texture>/
1. woody/
 2. fleshy/
 3. leathery/
 4. fibrous/
- #715. seed cones <maturity>/
1. maturing in 1 year/
 2. maturing in 1-2 years/
 3. maturing in 2-3 years/
 4. maturing in 3 years/
- #716. <seed cones> ovuliferous scales <arrangement>/
1. overlapping/
 2. opposite/
 3. abutting/
- #717. <seed cones> ovuliferous scales <distinctive, general characters that serve to distinguish the taxon>/
- #718. <seed cones> megasporangia <number>/
1. 1 per scale/
 2. 2 per scale/
 3. 3 per scale/
 4. 4 per scale/
 5. 5 per scale/
 6. 6 per scale/
 7. 7 per scale/

- 8. 8 per scale/
 - 9. 9 per scale/
 - 10. 10 per scale/
- #719 <seed cones> megasporangia <distinctive, general characters that serve to distinguish the taxon>/
- #720 <seed cones> seeds <distinctive, general characters that serve to distinguish the taxon>/
- #721 <seed cones> seeds <number per scale in Pinus and Taxodium>/
- 1. 1 per scale/
 - 2. 2 per scale/
 - 3. 3 per scale/
- #722 <seed cones> seeds <number per cone in Juniperus & Ephedra>/
- 1. 1 per cone/
 - 2. 2 per cone/
 - 3. 3 per cone/
 - 4. 8 per cone/
- #723 <seed cones> seeds <winging in gymnosperms>/
- 1. wings present/
 - 2. wings absent/
- #724 seed coats <differentiation in gymnosperms>/
- 1. not differentiated/
 - 2. differentiated into 2 layers, outer fleshy, inner hard <Ginkgo>/
- #725 <complete sentences giving numbers of genera and species present in Oklahoma> <MANDATORY>/
- #726 <complete sentences describing important taxonomic aspects such as problems in identification, classification, and/or nomenclature>/
- #727 <complete sentences describing important or characteristic aspects of family such as ecological and/or geographical distribution, economic significance, region of origin if adventive, introduced or naturalized, reproductive biology>/

APPENDIX B

DELTA-SPECS

*SHOW: Species of the Amaranthaceae in Oklahoma - specifications. Revised 19 Apr

*NUMBER OF CHARACTERS 727

*MAXIMUM NUMBER OF STATES 25

*MAXIMUM NUMBER OF ITEMS 200

*CHARACTER TYPES 1,TE 16,TE 21,TE 24,TE 28-29,RN 30,TE 33,TE 38-39,TE 48,TE

56-57,TE 64,TE 66,TE 75,TE 83-84,IN 87,TE 90-91,RN 99,TE 100,IN 103,RN 110,TE 114,TE 118,RN 124,TE 125,RN 126,TE 129,RN 133,TE 136,RN 137,TE 140,RN 144,TE

145-146,RN 148,TE 149-150,RN 152,TE 153-155,RN 157,TE 159,RN 160,TE 163,RN 167,TE 168-169,RN 171,TE 172-173,RN 175,TE 176-178,RN 180,TE 182,RN 183,TE 186,RN 190,TE 191-192,RN 194,TE 195-196,RN 198,TE 199-201,RN 202,TE 205,TE 208,TE 213,TE 220,TE 223-224,RN 233-234,TE 239,TE 246,TE 249-250,RN 258,TE 261-262,RN 268,TE 274,TE 283,TE 286-287,RN 295,TE 298-299,RN 305,TE 308,TE 320,RN 321,TE 324-325,TE 327,TE 328-329,RN 331-332,TE 337,TE 338,RN 340,IN 341-342,TE 344,TE 347,IN 351,RN 355-356,TE 357,RN 361,TE 364,RN 366,TE 371-373,RN 380,TE 384,TE 388,TE 393,TE 400,TE 403-404,RN 412-413,TE 418,TE 425,TE 428-429,RN 437,TE 440-441,RN 447,TE 453,TE 462,TE 465-466,RN 474,TE 477-478,RN 484,TE 487,TE 499,RN 500,TE 503-504,TE 506,TE 507-508,RN 510-511,TE

516,TE 517,RN 519,IN 520,TE 522,TE 524,TE 528,TE 531,TE 537,TE 544,TE 547-548,RN

556-557,TE 563,TE 569,TE 572-573,RN 581,TE 584-585,RN 591,TE 597,TE 606,TE 609-610,RN 618,TE 621-622,RN 629-630,TE 632,TE 635,IN 639,RN 643-644,TE 645,RN

649,TE 652,RN 654,TE 659-661,RN 668,TE 672,TE 675,TE 680,TE 685-687,RN 688,TE

690-691,TE 695,TE 697-699,RN 704,TE 706,TE 708-709,TE 711,TE 717,TE 719-720,TE

725-727,TE

*NUMBERS OF STATES 2,12 3,3 4,11 6-7,6 9,3 17,8 18,11 20,5 22,4 26,6 31,4 34,3 35,7 40,7 41,3 43,13 44,17 47,3 49,3 50,7 51-52,3 58,7 59,3 61,13 62,17 65,3

68,9 69,17 71-72,3 73,4 74,3 76,13 77,3 78-79,8 80,3 81,10 82,4 85,5 88,24 92,9
 93,8 94,17 95,15 96,25 97,10 102,22 104,9 105,7 106,17 107,15 108,25 109,10
 111,9 113,17 116,9 119,17 121,17 127,9 130,17 131,4 132,20 135,3 138,9
 141-142,17 156,20 161,9 164-165,17 179,20 184,9 187-188,17 203,3 206,3 209,10
 211,3 214,13 215,12 216,5 218,3 221,13 222,23 225,9 226,8 227,17 229,15 230,25
 231,10 236,13 237,14 238,5 240,3 242,3 244,4 245,5 247,12 248,23 251,9 252,8
 253,18 254,15 255,25 256,10 257,5 259,12 260,23 263,9 264,8 265,17 266,15 267,25
 270,13 271,4 272,14 273,5 277,3 280,13 281,4 282,5 284,11 285,23 288,9 289,8
 290,17 291,15 292,25 293,10 294,5 296,12 297,23 300,9 301,8 302,17 303,15 304,25
 307,12 309-310,3 312,4 314,6 315,4 316,7 317,3 318-319,4 322,3 323,4 326,3
 343,12 346,4 348,4 352,12 353,7 354,11 359,14 363,4 368,5 369,7 370,12
 374-375,12 376,6 377-378,12 382,3 386,12 387,6 390,4 391,3 394,13 395,12 396,5
 398,3 401,7 402,23 405,9 406,8 407,17 408,15 409,25 410,10 415,13 416,14 417,5
 421,3 423,4 424,5 426,12 427,23 430,9 431,8 432,17 433,15 434,25 435,10 436,5
 438,12 439,23 442,9 443,8 444,17 445,15 446,25 449,13 450,4 451,14 452,5 456,3
 459,13 460,4 461,5 463,11 464,23 467,9 468,8 469,17 470,15 471,25 472,10 473,5
 475,12 476,23 479,9 480,8 481,17 482,15 483,25 486,12 488-489,3 491,4 493,3
 494,4 495,7 496,3 497-498,4 501,3 502,4 505,3 526,3 530,12 532,6 534,4 535,3
 538,13 539,12 540,5 542,3 545,7 546,23 549,9 550,8 551,17 552,15 553,25 554,10
 559,13 560,14 561,5 565,3 567,4 568,5 570,12 571,23 574,9 575,8 576,17 577,15
 578,25 579,10 580,5 582,12 583,23 586,9 587,8 588,17 589,15 590,25 593,13 594,4
 595,14 596,5 600,3 603,13 604,4 605,5 607,11 608,23 611,9 612,8 613,17 614,15
 615,25 616,10 617,5 619,12 620,23 623,9 624,8 625,17 626,15 627,25 631,12 634,4
 636,4 640,12 641,7 642,11 647,14 651,4 656,5 657,7 658,12 662-663,12 664,6
 665-666,12 670,3 674,12 676,5 678,6 679,22 682,8 684,15 689,17 692,12 700,20
 701,5 702,11 703,4 707,10 712,3 713-715,4 716,3 718,10 721,3 722,4

*IMPLICIT VALUES 5-8,1 10-15,2 17-20,1 23,2 27,2 32,1 36,1 45,2 47,1 52,1 54,1
 60,2 63,2 65,3 67-68,1 70-71,1 77,1 80,1 89,2 92,1 98,2 104,1 111,1 112,2
 115-116,1 117,2 120,2 127,1 128,2 131,1 134,1 135,2 138,1 139,2 143,2 147,2
 151,2 158,1 161,1 162,2 181,1 184,1 185,2 203,2 207,1 210,1 216-218,1 225,1
 228,2 232,2 235,1 238,1 240-242,1 247,1 251,1 259,1 263,1 273,1 275-277,1 288,1
 296,1 300,1 306,1 309,1 310,2 311-313,1 316,6 317-319,1 323,1 326,1 330,2
 333-335,2 336,1 339,2 345-346,1 350,2 353,1 358,1 362-363,2 379,2 381,1 385,2
 396-398,1 405,1 411,2 414,1 417,1 419-421,1 426,1 430,1 438,1 442,1 452,1
 454-456,1 467,1 475,1 479,1 485,1 488,1 489,2 490-491,1 492,2 493,1 495,6
 496-498,1 502,1 509,2 512-514,2 515,1 518,2 521,2 523,2 525,1 529,2 540-542,1
 549,1 555,2 558,1 561-562,1 564-565,1 570,1 574,1 582,1 586,1 596,1 598-600,1
 611,1 619,1 623,1 628,2 633-634,1 638,2 641,1 646,1 650,2 667,2 669,1 673,2
 677,2 683,2 693-694,2

*DEPENDENT CHARACTERS

*MANDATORY CHARACTERS

APPENDIX C

DELTA-ITEMS

*SHOW: Speices of the Amaranthaceae in Oklahoma - items. Revised 19 April 1996.

*ITEM DESCRIPTIONS

AMARANTHACEAE <A.L. de Jussieu Amaranth Family>/

2,11 3,1/3 18,1/3/4 26,1-5 76,8 78,1 79,2/1 88,5/7/4 93,3 94,4/17/1 96,1/3 122,2
132,18/6/9/12 134,1/2 143,1 144<membranous or scarious> 147,1 206,1/2 209,9
211,2 235,1/2<rarely> 237,2-5<rarely> 242,1/2<rarely> 243,1/2 246<reddish-green
to white> 247,12/11 268<membranous or scarious> 307,5/1-3 317,1/2 343,1 349,2
352,1-3 354,3/2 359,1/14 367,1 374,2/3 375,1 376,4 377,1 679,12 681,2/1 682,4
692,1 725<The family is represented in Oklahoma by 7 genera and 17 species>
727<In general, species of the family are weedy in nature and favor disturbed
habitats. Their fruits are an important wildlife food and species of Amaranthus
were cultivated as a grain crop by Native Americans.>

Alternanthera <Forsk. Chaff Flower>/

2,11 3,3 4,8 9,2 18,1 22,2 25,1 26,5 29,1-5 71,1 78,1 79,2 85,3 88,11-8 90,9-10
91,1.5-2.5 93,3 94,11 95,9&6 96,1&2 97,2 115,1 118,3.5-5 119,11 122,2 131,1
132,18 134,2 143,1 145,1 146,1.5-3 203,2 206,1 207,1 210,1 211,2 212,1 237,5
238,1 240,1 241,1 242,1 243,1 245,2 247,9 248,5-7 249,1-1.2 250,2-3.2 251,1
252,1<3 nerved> 253,18<along margins and nerves> 254,3<with mucro> 255,1 256,10
306,1 307,5 310,2 311,1 312,1 314,1 315,1 317,2<at their base> 318,1 319,1
320,10 322,1 323,1 326,1 329,0.5-1 343,1 352,1 353,1 354,2 357,0.1 358,1 359,1
362,2 363,2 364,0.1 367,1 368,4 369,2 370,1 374,1 375,1 376,4 377,1 378,1 679,12
681,2 684,10 686,0.7-0.8 687,0.5-0.6 689,1 692,1 696,2 697,0.1 698,0.1 725<The
genus is represented in Oklahoma by 1 species.>

Alternanthera caracasana <Kunth Chaff Flower>/

2,11 3,3 4,8 9,2 18,1 22,2 25,1 26,5 29,1-5 71,1 78,1 79,2 85,3 88,11-8 90,9-10
91,1.5-2.5 93,3 94,11 95,9&6 96,1&2 97,2 115,1 118,3.5-5 119,11 122,2 131,1
132,18 134,2 143,1 145,1 146,1.5-3 203,2 206,1 207,1 210,1 211,2 212,1 237,5
238,1 240,1 241,1 242,1 243,1 245,2 247,9 248,5-7 249,1-1.2 250,2-3.2 251,1
252,1<3 nerved> 253,18<along margins and nerves> 254,3<with mucro> 255,1 256,10
306,1 307,5 310,2 311,1 312,1 314,1 315,1 317,2<at their base> 318,1 319,1
320,10 322,1 323,1 326,1 329,0.5-1 343,1 352,1 353,1 354,2 357,0.1 358,1 359,1
362,2 363,2 364,0.1 367,1 368,4 369,2 370,1 374,1 375,1 376,4 377,1 378,1 679,12
681,2 684,10 686,0.7-0.8 687,0.5-0.6 689,1 692,1 696,2 697,0.1 698,0.1

727<A. caracasana is a weed of roadsides, fields, and waste places, and is mainly found in the southern quarter of the state. A. repens is sometimes used as the name for Chaff Flower, but this name is a synonym of A. caracasana Kunth and A. pungens Kunth. Oklahoma specimens fall within the circumscription of A. caracasana. Flowering is from July to October.>

Amaranthus <L. Pigweed or Amaranth>/

2,11 3,1 9,1/2 18,1/2/3 22,2 25,1 26,1/2 28,10-125 76,8/11 77,3 78,1 79,1
88,8/7/5/24/11 90,2-35<45> 91,0.5-8.7<11.1> 93,3 94,1/5<occasionally>
95,9&4/15&6/4&6/3&6 96,1&2 97,2/1 118,1-85<95> 119,1/5 122,2 131,1
132,18&6/18/6
134,2&1 143,1 145,0.2-1.6 146,1-5 156,18/6&18 158,1&2/1/2 166,1 168,0.5-1.2<1.4>
169,1.5-3 179,18/6&18 181,1&2 189,1 191,0.5-1.2<1.4> 192,1.5-3 204,2 206,2 209,1
389,1 390,1/3 391,1/2 392,1 395,5 414,1 416,3/5 417,1 422,1 424,1/2 426,11
427,5/7/10/11 428,0.2-1.6 429,0.3-4 431,6 432,1 433,9&6/4&6/9/4/3 434,1 435,10
485,1 486,3/5 494,2/4 496,2<at base> 499,1-3.2 501,1 502,1 508,0.5-1.6
517,0.3-2.5 533,1 534,3/4 535,2 536,1/2 631,1 637,2/1 640,3/2 641,1 646,1
647,1<with 2 or 3 lobes> 648,1/2 651,2 652,0.5-1.5 655,1 656,2 658,1 662,1 663,1
664,4 665,1 679,12 681,1<circumscissile> 684,15 686,0.6-1.5 687,1-3 689,1 692,1
695<reddish brown to black> 698,0.1-1<1.5> 699,0.8-1.5 700,1 701,1 702,1/2/8
727<This genus is represented in Oklahoma by 8 species. Although A. gracilis Desf.
was reported to be collected in Oklahoma (SIDA 12(1): 233-237. J. Taylor #32067),
specimens of this species were not encountered in the herbarium collections
examined. Sheets were requested from the herbarium of Southeastern
Oklahoma State University (DUR), but none were received..>

Amaranthus albus <L. Tumbleweed>/

2,11 3,1 9,1 18,2 22,2 25,1 26,1 28,25-41/2 78,1 79,1 88,8 90,0.2-0.6<1>
91,0.5-2.5 93,3 94,1/5<occasionally> 95,9&4 96,1&2 97,2 118,0.1-1.5 119,1 122,2
132,18 134,2 143,1 145,0.5-1 146,2-3<4> 206,2 209,1 389,1 390,3 392,1 414,1
416,3 422,1 427,5-10 428,0.2-0.5 429,0.3-0.6 431,6 432,1 433,4 434,1 435,10
485,1 486,3 494,2 496,2<base> 499,1.5 501,1 502,1 508,1 517,0.8 533,1 534,3
535,2 536,1 560,3 566,1 571,5-10 572,0.2-0.5 573,0.8-2 575,6 576,1 577,4 578,1
579,10 631,1 637,2 640,3 647,3 651,2 652,0.3-0.6 655,1 662,1 663,1 664,4 665,1
679,12 681,1<circumscissile> 684,15 686,0.8-1.1 687,1-2 689,1 692,1 695<reddish
brown to black> 697,0.5-0.8<1> 699,0.8-1 700,1 701,2 702,2 727<A. albus is a weed
commonly associated with dry disturbed prairies, fields, roadsides, banks of streams
and lakes, and other waste places. It is found throughout the state, including the
panhandle. Flowering is from June to October. >

Amaranthus blitoides <L. Prostrate Pigweed>/

2,11 3,1 9,2-1 18,2 22,2 25,1 26,5 29,9.5-55 78,1 79,1 88,8-9 90,0.2-0.1
91,0.7-2.5 93,3 94,1 95,9&6 96,1&2 97,2 118,<2>4-11<13> 119,1 122,2
132,18 134,2 143,1 145,0.2-1.6 146,<1.2>2-3 206,2 209,1 389,1 390,3 391,2 392,1
416,5 422,1 427,10-5 428,<0.1>0.5-0.8 429,1.1-2.2<2.6> 431,6 432,1 433,4 434,1 435,10

486,3 494,2 496.2<base> 499,1.3-1.8 501,1 508,0.8-1 517,1.3-1.8 533,1 534,3
 535,2 536,1 560,5 566,1 571,10-5 572,<0.1>0.5-0.8 573,1.1-2.2(2.6) 575,6 576,1 577,4
 578,1 579,10 631,1 637,2 640,3 647,3 651.2 652.0.2-0.8 655,1 662,3 663,1 664,4 665,1
 679,12 681,1<circumscissile and rugose> 684,15 686,<0.4>1-1.5 687,0.7-2 689,1
 692,1 695<reddish brown to black> 699,<0.8>1-1.5 700,1 701,1
 702,1/2<occasionally> 727<A. blitoides is a weed commonly associated
 with disturbed prairies, fields, roadsides, railroads, banks of rivers and
 streams, and other waste places. It is found throughout the state, including
 the panhandle. Flowering is from June to October.>

Amaranthus arenicola <I.M. Johnston Sandhills Pigweed, Sandhills Amaranth>/
 2,11 3,1 9,1 18,3 22,2 25,1 26,1 28,40-90 76,8 77,3 78,1 79,1 88,10-7-5 90,0.4-2
 91,1.3-3.5 93,3 94,1 95,9&6 96,1&2 97,2/1 118,6-20<37> 119,1 122,2 132,18 134,2
 143,1 145,0.5-1 146,1.5-2<2.5> 156,18 158,2 168,0.5-1 169,1.5-2<2.5> 179,18
 181,2 189,1 191,0.5-1 192,1.5-2<2.5> 204,2 206,2 209,1 389,1 390,3 391,2 392,1
 416,5 422,1 427,5-7 428,0.51-1.6 429,2-3 431,6 432,1 433,4/9 434,1 435,10 486,5
 494,2 496,2 499,1.5-2.5 501,1 508,1-2 517,0.5-2.5 533,1 534,3 535,2 536,1 560,5
 563<sepals are recurved> 566,1 571,11 572,1-1.2 573,2-3 575,6<branched> 576,1
 577,11&8/6 578,1 579,10 631,1 637,2 640,3 647,1<with 3 branches> 651,2 652,0.5-1
 655,1 656,2 662,1 663,1 664,4 665,1 679,12 681,1<circumscissile> 686,1-1.2
 687,1.2-2 689,1 692,1 695<reddish brown> 697,0.8-1<0.1> 699,1-1.5 700,1 701,1
 702,1/2<occasionally> 727<A. arenicola is a weedy species that favors sandy
 habitats. It is commonly seen along the roadsides, edges of fields, prairies,
 waste places, and stream and creek banks. Its distribution includes the western
 half of the state. Flowering is from July to November.>

Amaranthus hybridus <L. Green Pigweed, Green Amaranth>/
 2,11 3,1 9,1 18,2 22,2 25,1 26,1 28,45<approximately> 78,1 79,1 88,7-24-5 90,1-5
 91,3-12.5 93,3 94,1 95,4&6 96,1&2 97,2 118,8-45 119,1 122,2 132,6 134,1&2 143,1
 145,0.5-1 146,2-5 206,2 209,1 389,1 390,1 391,2 392,1 395,5 414,1 416,5 417,1
 422,1 427,10 428,0.2-0.5 429,1.5-2.5 431,6 432,1 433,4 434,1 435,10 486,5 494,2
 496,2<at base> 499,2-3.2 501,1 508,0.5-1.5 517,1-3 533,1 534,3 560,5 566,1
 571,10 572,0.5 573,1.5-2.5 575,6 576,1 577,4 578,1 579,10 631,1 637,2 640,3
 647,1 651,2 652,0.5-1 655,1 662,1 663,1 664,4 665,1 679,12 680<slightly rugose>
 681,1<circumscissile> 684,15 686,1-1.5 687,2 689,1 692,1 695<black> 698,1 700,1
 701,1 702,1-2 727<A. hybridus is a weedy species commonly found in fields, along
 roadsides, and other waste places. It is found throughout the state, excluding
 the panhandle. Flowering is from June to November.>

Amaranthus palmeri <S. Wats. Redroot Pigweed, Carelessweed>/
 2,11 3,1 9,1 18,3 22,2 25,1 26,1 28,20-80<105> 78,1 79,1 88,24-7 90,14-27<45>
 91,1.6-8.7<11.1> 93,3 94,1 95,3/4/9&6 96,1&2 97,2/1 118,10-85<95> 119,1 122,2
 132,6&18 134,1&2 143,1 145,0.2-1.6 146,3-6 204,2 206,2 209,1 389,1 390,4 391,2
 392,1 416,5 422,1 424,1 427,5 428,0.6-1.2 429,2-4 431,6 432,1 433,4/3 434,1
 435,10 486,5 494,2 496,2<base> 499,1-2<2.5> 501,1 508,0.5-1.6 517,0.5-1<2> 534,4

535,2 536,1 558,1 560,5 571,11 572,0.8-1.2 573,2-3 575,6 576,1
 577,4&6<outer>/9/6 578,1 579,10 631,1 637,2 640,2/3 641,1 646,1 647,1<with 2 or
 3 lobes> 651,2 652,1-2 655,1 656,2 658,1 662,1 664,4 665,1 679,12
 681,1<circumscissile> 684,15 686,0.8-1.2 687,1-1.8 689,1 692,1 695<reddish
 brown> 698,0.4-1<1.5> 699,1-1.2 700,1 701,1 702,1 727<A. palmeri is a weedy species
 that prefers disturbed sites. Roadsides, creek beds, riverbanks, railroad
 right-of-ways, disturbed fields, prairies are common habitats. It is mainly found
 in the western two-thirds of the state, including the panhandle. Flowering is from
 June to October.>

Amaranthus retroflexus <L. Rough Pigweed, Rough Amaranth>/
 2,11 3,1 9,1 18,2 22,2 25,1 26,1 28<25-50> 76,11 77,3 78,1 79,1 88,24-7/5
 90<14-53> 91<3-7(10.2)> 93,3 94,5<especially along veins> 95,15&6/4&6 96,1&2
 97,2 118<12-60> 119,5 122,2 132,6<dense> 134,1&2 143,1 145<(0.2)0.8-1.2>
 146<2.5-5> 206,2 209,1 389,1 390,3 391,2 392,1 416,5 422,1 428<0.5-1> 429<2-3>
 431,6 432,1 433,4&6 434,1 435,10 486,5 494,2 496,2<base> 499<1-2.5> 501,1
 508<(8)1-1.2(2)> 517<1-2> 533,1 534,3 535,2 536,1 560,5 566,1 571,4-10
 572<.5-1> 573<2-3> 575,6 576,1 577,15&6 578,1 579,10 631,1 637,2 640,3 647,3
 648,1 651,2 652<.5-1> 655,1 662,1 664,4 665,1 679,12 681,1<circumscissile>
 684,15 686<1-1.5> 687<2-3> 689,1 692,1 695<reddish brown> 698<1> 699<1> 700,1
 701,1 702,1/8 727<A. retroflexus is a weedy species of disturbed sites. It is found in
 floodplains, bar ditches, and at the edges of fields, and is found in the western
 half of the state. Flowering is from May to October.>

Amaranthus rudis <Sauer Water Hemp>/
 2,11 3,1 9,1 18,3 22,2 25,1 26,1 28,20-125 78,1 79,1 90,6-15 91,0.7-4.5<5.5>
 93,3 94,1 95,9&6 96,1&2 97,2 118,0.2-2.5 119,1 122,2 132,6<interrupted and
 terminal>/18<axillary> 143,1 145,0.5-1.2 146,1.5-3 156,6<interrupted and
 terminal>/18<axillary> 158,1&2 166,1 168,0.5-1.2 169,1.5-3 179,6<interrupted and
 terminal>/18<axillary> 181,1&2 189,1 191,0.5-1.2 192,1.5-3 206,2 209,2 389,1
 390,4 391,1 392,1 416,5 417,1 422,1 427,5 428,0.5-1.2<1.8> 429,1.8-3 432,1
 433,3<outer>/9/6<inner> 434,1 435,10 486,5 494,2 499,1-2<3.5> 501,1 508,1-1.8
 517,0.3-1.5<2.1> 533,1 534,4 535,2 536,2 558,2 560,2 566,1 568,2 571,5-7
 572,0.2-1 573,0.5-2 576,1 577,4-3/9&6<occasionally> 578,1 579,10 631,1 640,3
 647,3 648,2 651,2 652,0.5-1.1 655,1 656,2 658,1 662,1 664,4 665,1 679,12 681,1
 684,15 686,0.8-1.4 687,1-1.5 689,1 692,1 695<reddish brown> 698,0.5-1 699,1
 700,1 701,1 702,1-2 727<A. rudis commonly is found in or near stream banks,
 lakeshores, floodplains, fields, and bar ditches. Its distribution is
 statewide. A. tamariscinus Nutt. was the name once used, but Sauer (1972)
 determined that the name A. tamariscinus was invalid for these fertile plants
 because the specimen to which Nuttall's name referred was a sterile hybrid
 between A. hybridus and an unnamed dioecious species. A. x tamariscinus
 Nutt. may be present in the state, but specimens that were examined were
 fertile.>

Amaranthus scleropoides <Uline & Bray Bone-Bract Pigweed, Bone-Bract Amaranth>/
 2,11 3,1 9,2 18,2/1<occasionally> 22,2 24<whitish> 25,1 26,1/2 28,10-21 78,1
 79,1 88,10-11 90,3.5-6 91,1.2-2 93,3 94,1 95,9&6 96,1&2 97,2 118,9-16 119,1
 122,2 132,18<axillary> 134,2 143,1 144<ovate, triangular, much thickened, and
 succulent> 145,0.6-1 146,1-2.4 204,2 206,2 209,1 389,1 390,3 391,1 392,1 395,5
 414,1 416,5 422,1 426,11 427,5-11 428,0.4-0.5 429,1.5-2 431,6 432,1 433,4 434,1
 435,10 485,1 486,5 494,2 496,2<base> 499,2 501,1 508,1 517,1.1 533,1 534,3 535,2
 536,1 560,5 566,1 568,1 570,11 571,5-11 572,0.4-0.5 573,1.5-2 575,6 576,1 577,4
 578,1 579,10 631,1 637,1 640,2 646,1 647,1<with 2 lobes> 651,2 652,0.6-1 655,1
 656,2 658,1 662,1 664,4 665,1 679,12 681,1<circumscissile> 684,15 686,1-1.4
 687,1.4-1.6 689,1 692,1 695<reddish brown> 697,0.5-0.6 699,1-1.2 700,1 701,1
 702,1-2 727<A. scleropoides is found in grass flats. Its distribution is limited to
 Major County. Although reported to flower throughout the year
 (Correll & Johnson 1970), our specimens indicate only August as the flowering time.>

Amaranthus spinosus <L. Spiny Pigweed, Spiny Amaranth>/
 2,11 3,1 9,1 18,2 22,2 25,1 26,1 28,25-50<70> 78,1 79,1 88,5-7 90,12-35<46>
 91,1.2-8 93,3 94,1 95,9&6 96,1 97,2 118,8-68 119,1 122,2 131,1
 132,6<terminal>/18<axillary> 134,1&2 143,1 145,0.2-1<2> 146,1-3 204,2 206,2
 209,1 389,1 390,3 391,1 392,1 414,1 416,5 417,1 422,1 424,2 426,11 427,5
 428,0.5-1<1.2> 429,1.2-2.5 431,6 432,1 433,9&6/4&6 434,1 435,10 486,5 494,2
 496,2<base> 499,1-1.5<1.8> 501,1 508,0.5-1.2<1.5> 517,0.1-1 533,1 534,3 535,2
 536,1 558,1 560,5 566,1 568,2 571,8-11 572,0.5-1 573,1-2 575,6 576,1 577,4&6/9&6
 578,1 579,10 631,1 637,2 640,3 646,1 647,1<2 or 3 lobes> 651,2 652,0.5-1.5<2>
 655,1 656,2 658,1 662,1 664,4 665,1 679,12 684,15 686,0.6-1.1 687,1-2 689,1
 692,1 695<reddish brown> 697,0.1-0.8 699,0.8-1 700,1 701,1 702,2 727<A.
spinosus is a weedy species of overgrazed pastures, roadsides, fields, fence rows, and
 other waste places. Its distribution is mainly in the eastern half of the state,
 but some specimens have been collected as far west as Woods County.
 Flowering is from June to September.>

Froelichia <Moench Snake Cotton>/
 2,11 3,1 9,1/2/3 16<villous> 22,2 25,1/2 26,1/2/5 28,30-90<125> 77,3&1 78,1 79,2
 88,5&6/10/11<occasionally> 90,2.5-24 91,2-9.4 93,3 94,9&4 95,4 96,1&2 97,2
 118,2-20<31> 119,8 122,2 132,6 134,1&2 136,1.3-5 143,1 145,0.5-3.5<3.7>
 146,0.5-3 203,2 204,2 206,1 211,2 212,1 214,13 215,5 219,2&1 221,11 222,5
 223,0.5-1.2<1.5> 224,3-5.5 226,1 227,10 229,9/4 231,10 237,5 243,2 247,10 248,5
 249,0.5-1.2<1.5> 250,3-5.5 252,1<3 nerves> 253,10 254,9/4 256,10 257,2/5 259,11
 260,5-10 263,1 264,1 265,1 266,1/4 306,1 307,5 315,2 317,2<at base> 320,2-5
 322,1 329,0.3-1.2 343,1 352,1 354,2 357,0.1-0.2 359,1 363,2 364,0.3-0.8<1> 367,1
 368,4 374,1 376,4 377,1 679,12 681,2 686,1-2.5 687,1-3 689,1 692,1 695<reddish
 brown to black> 696,2 698,0.1-1.5 699,0.8-1.5<2> 725<This genus is represented
 in Oklahoma by 2 species.>

Froelichia floridana <(Nutt.) Moq. Field Snake Cotton>/

2,11 3,1 9,1/2 16<villous> 22,2 25,2<below>/1<sometimes above> 26,1 28,30-90
 78,1 79,2 88,6-10/11<occasionally> 90,2.5-24 91,2-9.4 93,3 94,9<on abaxial
 surface>/4<on adaxial surface> 95,4 96,1&2 97,2 118,2-20<31> 119,8 122,2 125
 132,6 134,1&2<at ends of upper branches> 136,1.3-5 143,1 145,1.8-3.5<3.7>
 146,1-3 206,1 211,2 212,1 214,13 215,5 219,2<at base>/1<lobes> 221,11 222,5
 223,0.5-1<1.5> 224,3-5.5 226,1 227,10 229,9/4 231,10 237,5 243,2 247,10 248,5
 249,0.5-1<1.5> 250,3-5.5 252,1<3 nerves> 253,10 254,9/4 256,10 257,2/5 259,11
 260,5 263,1 264,1 265,1 266,1 306,1 307,5 315,2 317,2<at base> 320,3-5 322,1
 329,0.5-1 343,1 352,1 354,2 357,0.1-0.2 359,1 363,2 364,0.4-0.8<1> 367,1 368,4
 374,1 376,4 377,1 679,12 681,2 686,1-2 687,1.5-2.5 689,1 692,1 695<reddish brown
 to black> 696,2 698,0.1-1.5 699,1-1.5<2> 727<F. floridana is a species found in
 sandy soils. Sites such as sand dunes, stream valleys, roadsides, abandoned fields,
 disturbed prairies, and the edges of woodlands are common habitats. It is found
 throughout the state. Flowering is from June to October.>

Froelichia gracilis <(Hook.) Moq. Slender Snake Cotton>/

2,11 3,1 9,3 22,2 25,1 26,2/5 27,2 77,3&1 78,1 79,2 80,1/2 88,5 90,0.3-1.1
 91,2-5<7> 93,3 94,9 95,4&3<occasionally> 96,1&2 97,2 118,2-8 122,2 132,6
 134,1&2<at ends of upper branches> 143,1 145,0.5-3 146,0.5-2<3> 203,2 204,2
 206,1 211,2 212,1 214,13 215,5 219,2<at base>/1<lobes> 221,11 222,5 223,0.5-1.2
 224,2.5-4<6> 226,1 227,10 229,9/4 230,1&2 231,10 237,5 243,2<at base>/1<lobes>
 247,10 248,5 249,0.5-1.2 250,2.5-4<6> 252,1<3 nerves> 253,10 254,9/4 256,10
 257,2/5 259,11 260,5-10 263,1 264,1 265,1 266,4 307,5 315,2 317,2<at base>
 320,2-4.5 322,1 329,0.3-1.2 343,1 352,1 354,2 357,0.1-0.2 359,1 363,2
 364,0.3-0.8 367,1 368,4 374,1 376,4 377,1 679,12 681,2 686,1-2.5 687,1-3 689,1
 692,1 695<reddish brown to black> 698,0.1-1.2<1.5> 699,0.8-1.5 727<F. gracilis
 is found in sandy soils. Sites such as sand dunes, stream valleys,
 roadsides, abandoned fields, disturbed prairies, and woodlands are habitats.
 Occasionally, this species is found at the bottom of canyons. It is found throughout the
 state. Flowering is from June to October.>

Gossypianthus <Hook. Cotton Flower>/

2,11 3,3 4,7 9,2-3 10,2 11,2 12,2 13,2 14,2 15,2 17,1 18,1 22,2 25,1 26,5-4 27,2
 29,5-30 70,1 71,1 77,2&3 78,1 79,2 80,1 81,1 86,2
 88,4&5/11<basal>/7/8/5<cauline> 89,2 90,2-6<12> 91,0.4-1.2<1.5> 93,3 94,8
 95,4/9<occasionally> 96,1&2 97,2 115,1 117,1 119,8 122,2 131,1 132,18 134,2
 143,1 145,0.6-1.6 146,1.5-2.5 203,2 204,2 206,1 207,1 210,1 237,5 238,1 240,1
 241,1 242,1 243,1 248,5 249,0.5-1<2> 250,1.5-3 251,1 252,1/2 253,10 254,4 255,1
 256,10 306,1 307,5 310,2 311,1 312,1 313,2 314,1 315,2 317,1 318,1 319,1
 320,1-16 322,1 323,1 326,1 329,0.2-0.5<0.8> 343,1 352,1 353,2 354,10 357,0.1
 358,1 359,1 362,2 363,2 364,0.1-0.3<0.5> 367,1 368,4 369,2 370,1 374,1 375,1
 376,4 377,1 679,12 681,2 683,2 684,11-9 686,0.5-1<1.5> 687,0.8-2 689,1 692,1
 696,2 697,0.5-1<2> 699,1.5-3 725<The genus is represented in Oklahoma by 1 species.>

Gossypianthus lanuginosus <(Poir.) Moq. Cotton Flower>/

2,11 3,3 4,7 9,2-3 10,2 11,2 12,2 13,2 14,2 15,2 17,1 18,1 22,2 25,1 26,5-4 27,2
 29,5-30 70,1 71,1 77,2&3 78,1 79,2 80,1 81,1 86,2
 88,4&5/11<basal>/7/8/5<cauline> 89,2 90,2-6<12> 91,0.4-1.2<1.5> 93,3 94,8
 95,4/9<occasionally> 96,1&2 97,2 115,1 117,1 119,8 122,2 131,1 132,18 134,2
 143,1 145,0.6-1.6 146,1.5-2.5 203,2 204,2 206,1 207,1 210,1 237,5 238,1 240,1
 241,1 242,1 243,1 248,5 249,0.5-1<2> 250,1.5-3 251,1 252,1/2 253,10 254,4 255,1
 256,10 306,1 307,5 310,2 311,1 312,1 313,2 314,1 315,2 317,1 318,1 319,1
 320,1-16 322,1 323,1 326,1 329,0.2-0.5<0.8> 343,1 352,1 353,2 354,10 357,0.1
 358,1 359,1 362,2 363,2 364,0.1-0.3<0.5> 367,1 368,4 369,2 370,1 374,1 375,1
 376,4 377,1 679,12 681,2 683,2 684,11-9 686,0.5-1<1.5> 687,0.8-2 689,1 692,1
 696,2 697,0.5-1<2> 699,1.5-3 727<G. lanuginosus is a weedy species found along
 roadsides, stream valleys, and sandy or rocky prairies. Several varieties of G.
 lanuginosus are found in the state. Its distribution is throughout the state.
 Flowering is from June to November.>

Guilleminea <Kunth Dense Cotton Flower>/

2,11 3,3 4,7 9,2 25,1 26,5 29,8-32 77,2&3 78,1 79,2<cauline leaves> 85,3
 87<radical leaves are usually lost before fruiting> 88,5-11<basal>/7-5<cauline>
 90,10-13 91,20-25 92,1 93,3 94,1&10 95,4 96,1&2 117,1<broadly> 118,0.2-0.3 122,2
 132,18 133<densely clustered> 134,2 143,1 145,0.6-1.2 146,1.2-1.8 206,1 211,2
 212,1 214,4 215,5 216,1 219,1&2 221,10 222,2 226,6 227,10 237,5 243,1&2 245,4
 247,9 248,5 252,6 253,10 260,5 261,0.5-1 262,1 264,6 265,1 266,4-7 267,1 307,5
 315,2 316,1 317,2 320,0.2-0.5 322,1 329,0.1 343,1 352,2 355<inconspicuous>
 357,0.1 358,1 359,1<lobed> 363,2 364,0.1-0.3 367,1 368,4 370,1 374,1 376,4 377,1
 679,12 681,2 684,10 686,0.6 687,1 689,1 692,1 695<reddish brown> 697,0.3-0.5
 698,0.9-1 725<This genus is represented in Oklahoma by 1 species.>

Guilleminea densa <Humb. & Bonpl. ex Willd.) Moq. Dense Cotton Flower>/

2,11 3,3 4,7 9,2 25,1 26,5 29,8-32 77,2&3 78,1 79,2<cauline leaves> 85,3
 87<radical leaves are usually lost before fruiting> 88,5-11<basal>/7-5<cauline>
 90,10-13 91,20-25 92,1 93,3 94,1&10 95,4 96,1&2 117,1<broadly> 118,0.2-0.3 122,2
 132,18 133<densely clustered> 134,2 143,1 145,0.6-1.2 146,1.2-1.8 206,1 211,2
 212,1 214,4 215,5 216,1 219,1&2 221,10 222,2 226,6 227,10 237,5 243,1&2 245,4
 247,9 248,5 252,6 253,10 260,5 261,0.5-1 262,1 264,6 265,1 266,4-7 267,1 307,5
 315,2 316,1 317,2 320,0.2-0.5 322,1 329,0.1 343,1 352,2 355<inconspicuous>
 357,0.1 358,1 359,1<lobed> 363,2 364,0.1-0.3 367,1 368,4 370,1 374,1 376,4 377,1
 679,12 681,2 684,10 686,0.6 687,1 689,1 692,1 695<reddish brown> 697,0.3-0.5
 698,0.9-1 727<G. densa is a weedy species that prefers dry, sandy, rocky prairies,
 pastures, roadsides, canyons, and other waste places. It is found only in Cimmaron
 County. Dense Cotton Flower was once known as *Brayulinea densa* (Humb. &
 Bonpl. ex Willd.) Moq; however, now *B. densa* is recognized as a nomenclatural
 synonym for *G. densa*. Flowering is from June to October.>

Iresine <P. Br. Bloodleaf>/

2,11 3,3 4,2 9,1 18,3 22,2 25,1<occasionally> 26,1 28,30-110 65,2<slightly>
 76,12 78,1 79,2 88,5-7 90,15-60<80> 91,3-15 93,3 94,1 95,4-3
 96,1/9<occasionally> 97,2 118,8-35 119,1 122,2 132,9 143,1 145,0.3-1
 146,0.6-1.2<1.5> 156,9 166,1 179,9 203,2 204,2 206,2 209,1 389,1 390,3 391,2
 392,1 395,5 399,1 400<silvery white> 401,1 402,5-7 403,0.3-1 404,1-1.8 405,1
 407,8<at base of sepal> 408,4-3 409,1 410,10 414,1 416,5 422,1 426,9 427,5-7
 428,0.3-1 429,1-1.8 432,8<at base of sepal> 433,4-3 434,1 435,10 486,5 494,2
 496,2<base> 499,0.5-1.2 501,1 508,0.1-0.5 517,0.3-1 533,1 534,3 535,2 536,1
 539,5 543,1 545,1 560,5 566,1 568,2 570,9 571,5-7 572,0.3-1 573,1-1.8 576,8<at
 base of sepals> 577,4-3 578,1 579,10 631,1 637,2 640,2 645,0.2-0.5 647,1 651,2
 652,0.1 655,1 658,1 662,1 664,4 665,1 679,12 681,2 684,15 686,0.4-0.8<1.0>
 687,0.5-1.5<2> 692,1 695<reddish brown> 698,0.1-0.6 699,0.2-0.8 700,1 701,2
 702,2 725<This genus is represented in Oklahoma by 1 species.>

Iresine rhizomatosa <Standl. Bloodleaf>/

2,11 3,3 4,2 9,1 18,3 22,2 25,1<occasionally> 26,1 28,30-110 65,2<slightly>
 76,12 78,1 79,2 88,5-7 90,15-60<80> 91,3-15 93,3 94,1 95,4-3
 96,1/9<occasionally> 97,2 118,8-35 119,1 122,2 132,9 143,1 145,0.3-1
 146,0.6-1.2<1.5> 156,9 166,1 179,9 203,2 204,2 206,2 209,1 389,1 390,3 391,2
 392,1 395,5 399,1 400<silvery white> 401,1 402,5-7 403,0.3-1 404,1-1.8 405,1
 407,8<at base of sepal> 408,4-3 409,1 410,10 414,1 416,5 422,1 426,9 427,5-7
 428,0.3-1 429,1-1.8 432,8<at base of sepal> 433,4-3 434,1 435,10 486,5 494,2
 496,2<base> 499,0.5-1.2 501,1 508,0.1-0.5 517,0.3-1 533,1 534,3 535,2 536,1
 539,5 543,1 545,1 560,5 566,1 568,2 570,9 571,5-7 572,0.3-1 573,1-1.8 576,8<at
 base of sepals> 577,4-3 578,1 579,10 631,1 637,2 640,2 645,0.2-0.5 647,1 651,2
 652,0.1 655,1 658,1 662,1 664,4 665,1 679,12 681,2 684,15 686,0.4-0.8<1.0>
 687,0.5-1.5<2> 692,1 695<reddish brown> 698,0.1-0.6 699,0.2-0.8 700,1 701,2
 702,2 727<*I. rhizomatosa* prefers low wet woods, stream banks, and
 wooded areas at the base of canyons, bluffs, and hills. It is found mainly in
 the eastern half of the state. Exceptions include populations in Caddo and
 Comanche Counties. Flowering is from August to November. >

Tidestromia <(Nutt.) Standl.>/

2,11 3,1 9,1/2/3 16<stellate pubescence, older stems somewhat glabrous> 22,2
 25,1 26,2 29,10-50 77,2-3 78,1 79,2 88,8-7 90,6-22 91,0.5-2.2 93,3 94,17 95,4-9
 96,1&2 97,2 118,2-30 119,17 122,2 132,18 134,2 143,1 145,0.7-1.8 146,1-3 206,1
 211,2 212,1 214,13 215,5 219,1 221,12 222,5 223,0.5-1 224,1.75-3<3.55> 226,6
 227,17 229,4 230,1 231,10 237,5 243,1 245,2 248,5 249,0.5-1 250,1.75-3<3.55>
 252,6 253,17 254,4 255,1 256,10 306,1 307,5 315,2 317,2<at base> 320,1-2 322,1
 329,0.5-1<1.3> 343,1 352,1 354,2 357,0.1-0.3<0.5> 359,1 363,2 364,0.1-0.2<2.5>
 367,1 368,4 370,1 374,1 375,1 376,4 377,1 679,12 681,2 686,0.5-0.8<1>
 687,0.5-1<1.5> 689,1 692,1 697,0.1-0.5<1> 699,0.2-0.8<1> 725<This genus is
 represented in Oklahoma by 1 species.>

Tidestromia lanuginosa <(Nutt.) Standl. Espanta Vaqueros>/

2,11 3,1 9,1/2/3 16<stellate pubescence, older stems somewhat glabrous> 22,2
 25,1 26,2 29,10-50 77,2-3 78,1 79,2 88,8-7 90,6-22 91,0.5-2.2 93,3 94,17 95,4-9
 96,1&2 97,2 118,2-30 119,17 122,2 132,18 134,2 143,1 145,0.7-1.8 146,1-3 206,1
 211,2 212,1 214,13 215,5 219,1 221,12 222,5 223,0.5-1 224,1.75-3<3.55> 226,6
 227,17 229,4 230,1 231,10 237,5 243,1 245,2 248,5 249,0.5-1 250,1.75-3<3.55>
 252,6 253,17 254,4 255,1 256,10 306,1 307,5 315,2 317,2<at base> 320,1-2 322,1
 329,0.5-1<1.3> 343,1 352,1 354,2 357,0.1-0.3<0.5> 359,1 363,2 364,0.1-0.2<2.5>
 367,1 368,4 370,1 374,1 375,1 376,4 377,1 679,12 681,2 686,0.5-0.8<1>
 687,0.5-1<1.5> 689,1 692,1 697,0.1-0.5<1> 699,0.2-0.8<1> 727<T. lanuginosa is a
 weedy species that is commonly found in bar ditches, sand dunes, field edges, grass
 flats, stream valleys, and at the base of sandstone and gypsum ridges. It is found
 in the western half of the state including much of the panhandle.>

APPENDIX D

TONAT

*SHOW: Translate into natural language
*HEADING: Amaranthaceae of Oklahoma
*LISTING FILE TONAT.LST *PRINT FILE TONAT.PRT
*DATA BUFFER SIZE 6000
*INPUT FILE SPECS

*SPECIAL STORAGE

*TRANSLATE INTO NATURAL LANGUAGE
*OMIT TYPSETTING MARKS
*REPLACE ANGLE BRACKETS
*OMIT CHARACTER NUMBERS
*OMIT INAPPLICABLES

*ITEM SUBHEADINGS

*LINK CHARACTERS 1-18 19-20 21-22 24-29 64-65 66-67 70-86
87-91 114-119 131-136 143-146 156-159 160-161 166-169
179-182 189-192 193-196 202-210 211-214 215-224 233-235 236-249
257-262 268-271 272-287 294-299 305-306 307-320 321-329 332-335
336-338 339-341 343-351 352-357 358-364 366-369 371-373 377-378
379-384 385-388 390-394 395-404 411-412 413-415 416-429 436-441
447-450 451-466 473-478 484-485 486-499 500-508 511-514 515-517
518 520 521-522 523-528 529-532 534-538 539-548 555-556 557-559
560-573 580-585 591-594 595-610 617-622 628-629 631-639 640-645
646-652 654-657 659-661 665-666 667-672 673-676 679-689 691-702
703-704 705-706 707-708 710-715 716-717 718-719 720-723

*INPUT FILE CHARS

*PRINT HEADING
*INPUT FILE ITEMS

7-7-88
VITA
Rhonda R. Hampton
Candidate for the Degree of
Master of Science

VITA

Rhonda R. Hampton

Candidate for the Degree of

Master of Science

Thesis: A TAXONOMIC INVESTIGATION OF THE GENERA AND SPECIES OF
THE AMARANTHACEAE IN OKLAHOMA

Major Field: Botany

Biographical:

Education: Graduated from Rosepine Jr. Sr. High School, Rosepine, Louisiana in May 1988; received Bachelor of Science degree in the Biological Sciences from Southwestern Oklahoma State University in July 1992. Completed the requirements for the Master of Science degree with a major in Botany at Oklahoma State University in July 1996.

Experience: Employed as a lab assistant as an undergraduate in the Biology Department at Southwestern Oklahoma State University 1989-1992; prepared lab for Biological Concepts 1989-1992; employed as a graduate teaching assistant at Southwestern Oklahoma State University 1992-1993; taught Botany lecture and lab at Southwestern Oklahoma State University Summer 1993; employed as a science librarian at the University of Oklahoma Biological Station, Summer 1994-1996; employed as a graduate teaching assistant at Oklahoma State University, Department of Botany, 1993 to 1996.

Professional Organizations:

Beta Beta Beta National Honor Society for the Biological Sciences
Gamma Delta Kappa Women's Honor Society